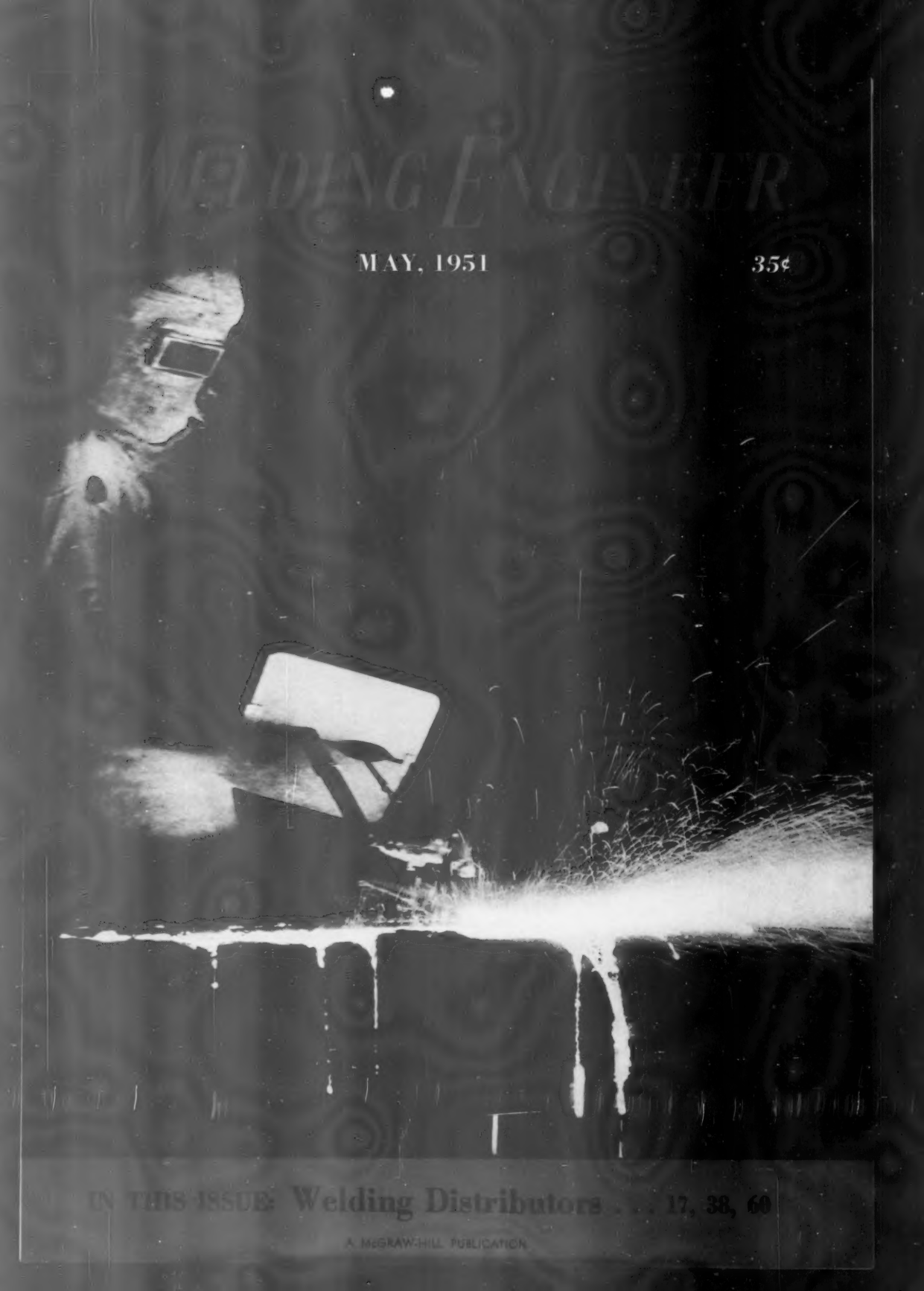
WELDING ENGINEER

MAY, 1951 35¢



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2. It is flexible to make for ease of handling.

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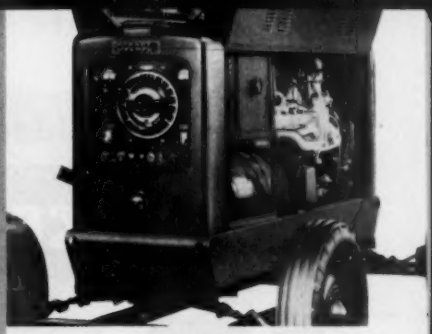
Welding **CABLE**



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. . . are available in a range of sizes to meet your welding requirements in factory, shop, or garage—portable or stationary.

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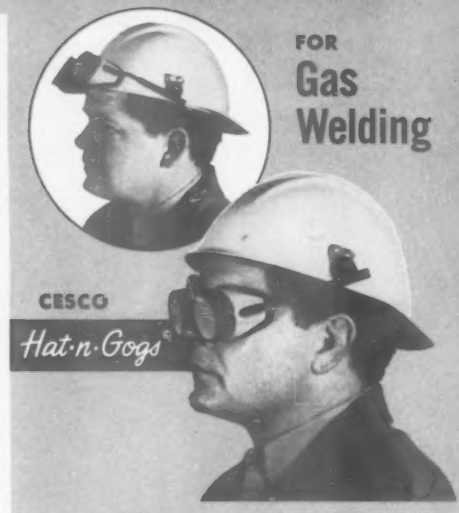

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A McGRAW-HILL PUBLICATION

VOLUME 36 NUMBER 5

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MAY, 1951

COVER: *Flame-scarfing to remove surface imperfections from a bloom at the Bethlehem, Pa., plant of the Bethlehem Steel Co.*

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COPPER ALLOY HOLDERS

Jackson's basic design, all purpose holders are the only 98% copper alloy holders heat treated for greater strength, hardness, conductivity.

New Double-A models have lower jaws replaceable at a fraction of the cost of the entire lower tong.

AA-1 takes electrodes through 1/4" AA-3 and AA-3S through 3/8." AA-3S has larger handle for cooler operation.

Old favorites A-1, A-3, A-3S, with one-piece tongs (and same capacities) are being continued.

JACKSON

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They are made to work in places hard to get at, and may be passed through narrow openings.

They are more completely insulated than other Jackson holders, yet there is no fumbling to drop a stub, or insert a new rod, due to their tong type construction.

Made of light metal alloy, they have all the advantages of Jackson's Featherlight holders, within their rated capacities. Model JH-2, electrodes through 5/32", model JH-3, through 1/4".

FEATHERLIGHT HOLDERS

Hands do not tire as quickly, when Featherlight holders are used. Made of lightweight alloy, they weigh 36% less than copper alloy holders of the same capacity.

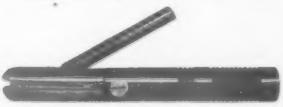
Model A-W takes 1/4" electrodes, model A-5S takes them through 5/16". Both give excellent service within their rated capacities, and many weldors use them for all purposes.

On these holders cables must be clamped mechanically.

BLADE TYPE HOLDERS

Many weldors like the simplicity of holders with blades of spring steel, easily and inexpensively replaced.

They will prefer Jackson's BT holders for their smooth outlines and crown type insulators.



INSULATORS. Jaw insulators on these and all other Jackson insulated holders are of laminated fiberglass with melamine binder. They are exceptionally strong, and effectively withstand the greater duty cycles called for today.

GOGGLES and EYESHIELDS

The little gas weldor at the right points with pride to his headrest goggles. They're Jackson's type W-50, a quality product designed for safety and comfort. Although, at 8 ounces, they are the lightest of their kind on the market, they give maximum protection for gas welding, cutting, brazing.

Type G-50, with clear, hardened lenses, is used for chipping and grinding. Both types are light and easy to wear, simple and easy to adjust, practical and easy to raise and lower.

Other Jackson products include headrest eyeshields and spectacles for gas welding, cutting and brazing, and type J-1, an eye and face shield in clear plastic as well as in shades of green, that has found many uses in various industries.

All Jackson products sold only through distributors and dealers near you.

JACKSON PRODUCTS — **WARREN • MICHIGAN**

NEWS FROM WASHINGTON

MRO Priorities Too Liberal to Last

MRO PRIORITIES are in a serious jam already. Too much demand for too little supply. There aren't enough supplies to meet the suddenly enormous DO-97 demand since Regulation 4 was issued. (See page 5, April 1951, Welding Engineer).

Much of the trouble is over the interpretation of just what makes up "operating supplies." For instance, welding rod, when used to maintain machinery or to make repairs, is clearly operating supplies to the planners who wrote Regulation 4. But when welding rod goes out of the plant as part of the finished product, NPA considers it "production supplies" and as such outside the scope of MRO.

NPA officials admit that the order is loosely worded, but they also think that many businesses have stretched the intent of the regulation in order to build up inventories of production material under the guise of ordering MRO supplies. One unexpected factor was the large-scale buying of MRO by the Armed Forces under DO-97. Washington has no easy solution to this problem. It is virtually impossible to stop military buying or even slow it down. One solution being considered is to restrict DO-97 to the A and B lists of military and essential civilian needs. In the meantime, NPA is policing compliance with the order by having steel producers report any excessively large orders bearing the DO-97 label.

Ferro-Alloys First under Full Allocation

NPA ON APRIL 6 amended its basic steel order to establish procedures for virtually complete control over the use of scarce ferro-alloys like cobalt, tungsten, columbium, molybdenum, etc. in the production of alloy irons, steels or nonferrous alloys. The aim is to match production against the need—but military and essential civilian requirements will naturally get first call.

By June, alloy producers think their entire output, will be under complete allocation and produced under monthly melting schedules approved in Washington. Melt sheets will show how much of each element is to be used for each product, amount of orders on hand, physical and chemical specifications for the product, proposed end uses and delivery dates.

Freight Car Program Picking up Momentum

FREIGHT CAR construction is recovering after being way off schedule. NPA has directed steel producers to provide 288,500 tons of steel products during May for car construction and repair—enough for 9,000 new cars and car repairs for the month. In addition, 8,600 tons of steel were set aside for welding electrodes under a separate directive. NPA officials are predicting a sharply increased car output to more than 10,000 cars per month by June.

Even though they have been getting about four times the amount of steel they received in 1950, builders of freight cars will need at least two years to work off their backlog.

Recent NPA Orders Affect Metals Supply

HERE'S WHAT NPA orders since March have done to metal situation:

Steel: Made steel available for oil well drillers through DO rated orders (M-46); producers notified to increase amount of steel reserved to fill DO orders; reduced steel for consumer durable goods in second quarter to 50% of average quarter of first six months of 1950 (M-47); fixed carbon-steel products for distribution through warehouses at 85% of base period receipts by warehouses.

Aluminum: Required producers of pig and ingot aluminum to supply up to 11½% of their output to independent fabricators extending DO orders; limited fabricators in the second quarter to 65% of their average quarterly rate of consumption the first six months of 1950; postponed to May 1 restrictions against the use of aluminum in about 200 civilian products; offered program by which electric utilities are able to get aluminum supplies for distribution and transmission lines.

Copper and Cu-Base Alloys: Limited fabricators in second quarter to 75% of average quarterly rate of consumption the first six months of 1950; allowed consumers who were shut down 15 days or more during the 1950 base period to make special base period adjustments in the second quarter.

Molybdenum: Established a broad allocation system to replace Individual directives, effective after May 1 (M-33 as amended); also limited amount of molybdenum in stainless steels to 2.5% (M-52).

Tin: Put U. S. users of pig tin under allocation effective May 1. Permitted tinplate and terneplate manufacturers during second quarter to increase temporarily the use of pig tin to 95% of monthly base period use.

Columbium and Tantalum: Cb and Ta and their ferro-alloys put under allocation (M-49); Cb and Ta going into steel restricted to DO orders or NPA directives.

Nickel: Controls already in effect extended into the second quarter and additional products listed in which use of nickel is banned (M-14 as amended).

Columbium, Tantalum Put under Allocation

IF YOU USE less than 10 pounds a month of columbium or tantalum, you can go right ahead. But if your requirements are greater, you will require authorization from NPA, according to Order M-49. This order prohibits delivery of these corrosion- and temperature-resisting

NEWS FROM WASHINGTON (Continued from page 5)

materials except on specific allocation.

Applications for allocations of columbium, tantalum and their ferro-alloys must be filed with NPA on forms NPAF-15 and NPAF-41 not less than 15 days before the beginning of the month in which delivery is sought. Authorizations will then be issued by NPA to both suppliers and purchasers. Records of transactions under this order must be kept for at least two years.

In another NPA action, an amendment to Order M-3, the amount of columbium and tantalum that can be used in the production of stainless steel was reduced to eight times the carbon content of the steel. Previously, ten times the carbon content had been permitted.

CMP Starting Date Now Definitely July 1

FORMAL ANNOUNCEMENT will soon be made of the Controlled Materials Plan, which will be put in operation in the third quarter of 1951. While final details of the Plan are not yet completely clear, the scheduled starting date is July 1, 1951.

In general, the new control plan follows the original CMP quite closely. The controlled materials will be steel, copper and aluminum and DO ratings will be retained. "Bills of Materials" will be needed to formulate estimates of metal requirements but these are expected in final form before the third quarter. Prime users, receiving applications for allotments about April 15, will have until May 31 to submit their Bills of Materials covering their third-quarter requirements to their claimant agencies.

Steel Hold-Back Ordered for June

FURTHER reserves in certain carbon and alloy steel products were ordered by NPA for June to cover increases in defense rated (DO) orders. Steel producers were individually directed as to the amounts to be held back for DO needs. Among other items, wire rod reserve was raised from 20 to 25%; wire rods from 45 to 50%, and low- and high-carbon wire reserves were raised 1% each.

Aluminum Available for Power Maintenance

USE OF 49,000,000 pounds of aluminum wire, cable or bus bar and aluminum conductor accessories has been authorized by NPA for the second quarter of this year for the maintenance and expansion of distribution and transmission lines. Order M-50, which puts the program into operation, at the same time exempts electric power utilities from the limitations of NPA Order M-7 (governing the use of aluminum) so far as conductors and accessories are concerned. However, other forms of aluminum used by utilities continue to be covered by M-7.

A rating of DO-48 may be used to acquire aluminum conductor. The standard quarterly quota has been set at 20% of the gross weight of aluminum conductor used by the company for the same purpose in 1950 or, alternatively, 80% of the amount of aluminum used during the corresponding quarter of 1950. Those who use less than 5,000 pounds per quarter are not held to the quantity restrictions. For major plant additions beyond the quota, specific authorization from DEPA is required.

DO Priorities Awaiting CMP Start

GRIPES from the military about DO priorities are mounting. Despite priorities, material shortages have delayed deliveries of tanks, shells, rockets, etc. says the Munitions Board—especially since all DO's carry the same priority no matter what the end use. However, the mobilizers are sticking with DO's—at least until the CMP is here—but as a stop-gap measure will probably increase the amounts of materials that producers must devote to DO contracts.

High-Moly Steel Shelved by NPA

STAINLESS STEEL of the grade known as AISI Type 317 became a casualty of the mobilization program with NPA's Order M-52, which limits to 2.5% the molybdenum content of stainless steel. AISI type 316 which ordinarily has a molybdenum content of 2 to 3% will be allowed, but with a top level of 2.5%.

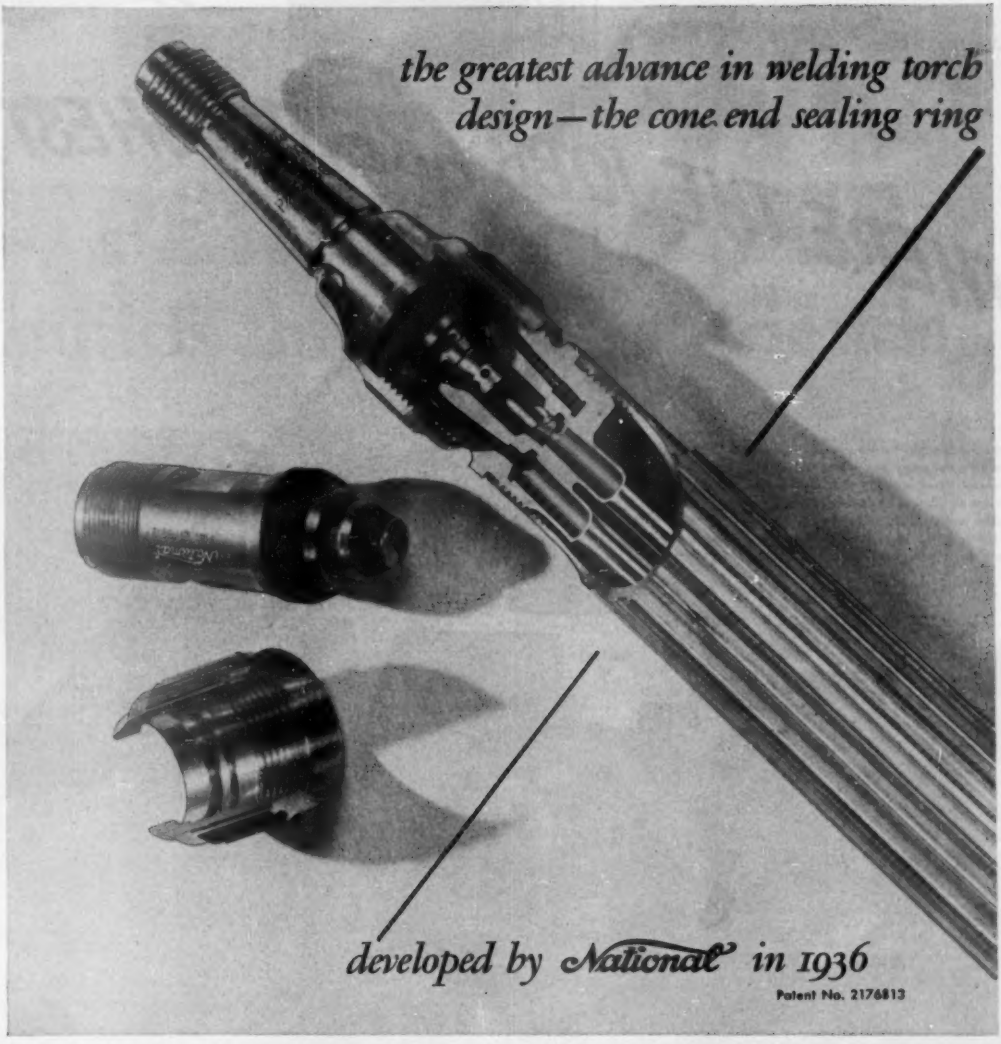
Admittedly, the "life" of stainless products used in such industries as chemical, textile and oil refining will suffer. NPA will consider applications for adjustment or exception where it can be shown that the enforcement of the order is not in the interest of the defense program or that it will result in undue hardship.

Enough Steel for Truck Needs

AUTOMOBILE companies have been assured enough steel to make military vehicles and trucks—in addition to an adequate supply of repair parts. The importance of "keeping 'em rolling" has given the truck business the green light as it did in World War II. Passenger car production figures show no effects of shortages yet despite conversion to war materiel.

* * *

SHORT-TERM AMORTIZATION on 313 more expansion projects, including welding equipment, should interest builders, subcontractors, fabricators and toolmakers who are in the market for more business. So far, a total of over $3 billion has been approved for about 400 companies. For the complete list write to Commerce Dept. News Room, Washington, D. C. for DPA news release 14.



The greatest advancement in welding torch design and construction was made when NATIONAL engineers developed and patented the better way of making an effective, leakproof, damage proof joint between mixer and welding torch head; between cutting attachment and torch butt.

These neoprene sealing rings have taken the trouble out of the welding torch—they eliminated the use of a wrench to keep a tight seat. No other seating arrangement has given so much satisfaction over so long a time period. IT'S THE SEALING RING WHICH SAVES YOU MONEY — WHICH MAKES YOUR WELDING TORCH AND CUTTING ATTACHMENT STAY ON THE JOB LONGER — AND IT IS A PATENTED FEATURE OF NATIONAL WELDING EQUIPMENT CO.

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Made by National SINCE 1910 WELDING EQUIPMENT CO., San Francisco 5, California

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Torchweld Scarfing Torches are relied upon for fast, sure hot-scarfing of alloy steel billets at the Alan Wood Steel Company, steel makers of Conshohocken, Pa. These economical, easy-to-handle torches are used to remove "snakes, scabs, checks and seams" preparatory to rolling the billets in the Alan Wood plate mill. Billets range from 4' to 12' long and from 4" x 22" to 7" x 22" thick.

A battery of four NCG "RS" Cutting Machines are used to speed production at the R. C. Mahon Co., Detroit, Mich., steel fabricators and manufacturers of a wide variety of industrial and building products. Mahon has standardized on NCG's Torchweld No. 75 hand cutting torches, and relies exclusively upon NCG gases. In the case of machine cutting, gases are abundantly provided from a portable bank, seen at left in the picture.

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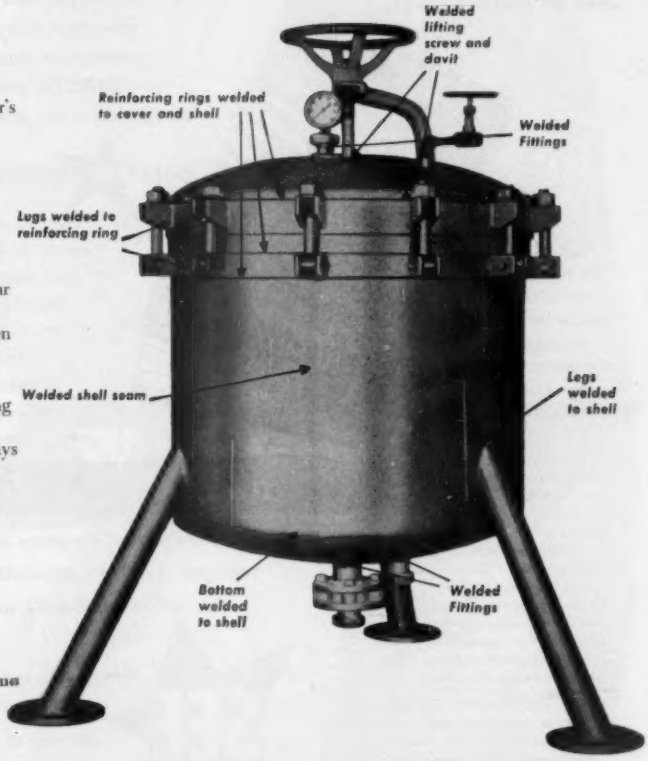
Welded lifting screw and davit
Reinforcing rings welded to cover and shell
Welded Fittings
Lugs welded to reinforcing ring
Welded shell seam
Legs welded to shell
Bottom welded to shell
Welded Fittings

Inert-gas arc welds the longitudinal seam of the body, which is formed of Everdur sheet.

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EUTECTIC WELDING ALLOYS CORPORATION

40-40 172nd STREET, FLUSHING, NEW YORK

DESIGN.... THAT GIVES YOU EVERY SERVICE ADVANTAGE . . .

☆From a complete line of electrode holders and ground clamps you can select the one for your particular service that will give you top performance.

Wagner electrode holders have been developed over a period of years to bring to the welder the long service life and cool operation necessary for economical operation.

1. High conductivity Arc Resisting WAGNERLOY Tong Members.
2. Tough, heat resisting, high impact insulators.
3. Socket cable connection for either mechanical or soldered connection.
4. Powerful coaxial springs —adjustable tension on most models.
5. Patented channel construction for cool operation.

Welded with Wagner

WAGNER

ELECTRODE HOLDERS • GROUND CLAMPS

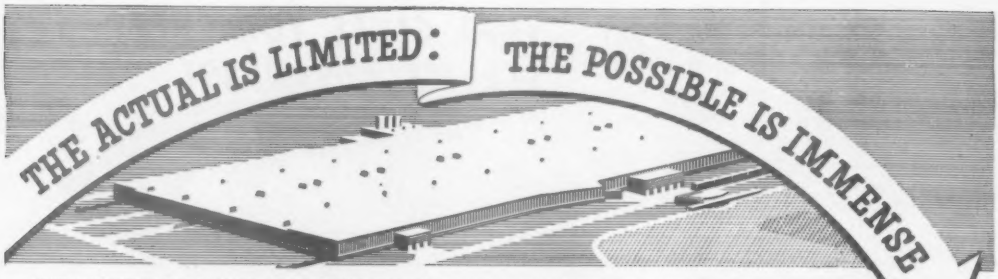
Wagner Products
ARE SOLD ONLY THROUGH WELDING SUPPLY DEALERS

Wagner ground clamps have been designed for the practical purpose of grounding the work to the welding machine.

1. Heavy WAGNERLOY tong construction.
2. Broad Flat Base for getting under flat work.
3. Powerful Coaxial spring, enclosed in tong member.
4. Adjustable spring tension on most models.

Wagner Welding Products are the result of more than thirty-three years of experience in welding and practical knowledge of mechanical and electrical engineering. WAGNERLOY, a copper alloy, was perfected by Wagner engineers to provide maximum conductivity, high arc resistance and great tensile strength.

WAGNER MANUFACTURING COMPANY 34 W. MAIN ST. JACKSON, MISSOURI



NEW LINCOLN PLANT CREATED BY INCENTIVE-INSPIRED CO-ACTION IN DEVELOPING POSSIBILITIES IN PRODUCT

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DESIGNS ORIGINEERED IN WELDED STEEL ARE ALWAYS LOWER IN COST

WITH welded construction, new product shapes can be created, utilizing the inherent low cost economies of steel. There is less cost per pound with steel. Fewer pounds are needed. Furthermore, each pound of metal can be applied where it will do the most good.

Convention-bound designs can be completely discarded. Welding enables the engineer to exercise his imagination . . . to create more efficient product shapes . . . to get better distribution of metal. He can use either standard rolled steel shapes or fabricate his own sections.

The "thought starter" sketches show how a typical section may be developed to save material and cut labor cost. Your Lincoln Welding Engineer will gladly demonstrate how these basic cost-saving principles of welded steel can be applied to your products. Simply write The Lincoln Electric Company, Cleveland 1, Ohio.

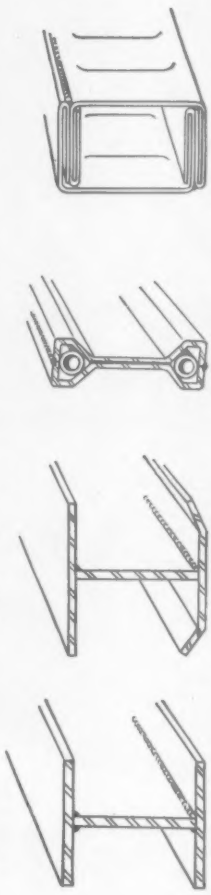


Fig. 3. "I" section. Higher strength to weight ratio under lower loading conditions is gained through better distribution of metal in outer areas. Needs 50% less metal than Figure 1 . . . 40% less metal than Figure 2.

Fig. 4. Bottom flange of "I" section can be brake formed from light material and Automatic Lincolnwelded on one side only to web. Saves 10% metal and 50% fabricating cost over sections shown in Figure 3.

Fig. 5. Pressed steel section formed from light gauge metal. Die formed half sections are assembled over steel tubing and Automatic Lincolnwelded at outer edges. Weighs 90% less than Figure 1.

Fig. 6. Box section is fabricated from lighter gauge sheet than Figure 5. Flanges are folded metal to increase amount of material at outer edges. Web is corrugated to achieve plastic memory factor and weighs 25% less than Figure 5. In Automatic Lincolnwelded for lowest fabrication cost.

the ACTUAL

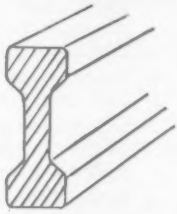


Fig. 1. Cross section through an iron cantilever beam designed to resist a bending moment.

increasing the YIELD

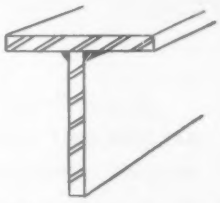


Fig. 2. Tee section through comparative beam fabricated by welded steel. Needs 75% less metal than Figure 1 to achieve equal strength in bending.

the IMMENSITY of the POSSIBLE

stronger products with less metal... at lower cost

SEE HOW WELDED STEEL IMPROVES DESIGN EFFICIENCY

Machine Design Sheets free on request to designers and engineers. Write on your letterhead to Dept. 75,

THE LINCOLN ELECTRIC COMPANY

CLEVELAND 1, OHIO

ESTABLISHED 1916 THE WELDING ENGINEER MAY, 1951

Only Ourselves to Blame

CALIFORNIANS are full of ideas. Some of them are good, others may be bad, but their fertile production shows that the people of the Golden State are thinking. Now the articulate minority has come up with something that is going to force the welding industry to do some thinking.

The California state legislature has under serious consideration three bills designed to enact legal requirements for the certification of weldors. These bills all propose:

"The California Apprenticeship Council shall establish minimum standards for certified weldors in each trade and when advisable in each part or branch of a trade and shall issue to each qualified person a weldor's certificate, general or special, certifying that the holder thereof has successfully met the minimum standards for the type of weldor's certificate issued the holder."

"General" is defined as a weldor's certificate covering an entire trade, and "special" as a certificate covering a part or branch of a trade.

The alarming news is yet to come. Another part of the same bill specifies that the California Apprenticeship Council shall be assisted in its work of establishing proper minimum standards by a committee of six. Two members of the committee must be engineers (one of them a licensed structural engineer) and two members architects. It isn't specified what the remaining two members should be, but it doesn't matter. The committee is already heavily loaded.

In view of the general reluctance of structural engineers to accept welding and the complete ignorance of most architects concerning it, what type of standards will be developed for the certification of weldors? We shudder to think of what such a committee might come up with.

Don't put all the blame, however, on the people behind the proposed California law. Their approach may be bad, but they are trying to do something useful. They are trying to fill the vacuum that exists today in the field of weldor certification.

The AWS standard qualification procedure for the qualification of weldors is good as far as it goes, but it fails to go far enough. Nor do the procedures sponsored by other national associations, who have increased the confusion by taking a hand in the game and then trying to lay down their own rules as to how it should be played.

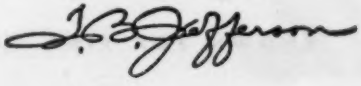
What's needed is something simple. At present a weldor gets qualified for one job and stays qualified only as long as he is working on it. When he goes to another job, he has to be qualified all over again. Each qualification costs an employer money for testing and examining specimens. It is this present unsatisfactory situation that the proposed California law is trying to overcome.

Even if the California bill were a good law, however, we don't think it should be enacted. Once the gate opened, we would soon find that 48 separate state laws had gotten out. Can you imagine the confusion? Besides offering welcome new opportunities for grafting politicians, such laws could cut seriously into the basic American principle of freedom of choice in employment. To weld at all, a man might be legally compelled to belong to a certain organization.

State laws wouldn't have to do the job if it were not for the vacuum that we have already mentioned. One way to render state regulation wholly unnecessary would be to establish a national Weldor's Certification Bureau, either as a part of AWS or sponsored by it in collaboration with coöperating engineering societies and other interested organizations. A weldor carrying a certificate from this Bureau would be free to travel from job to job or from state to state and would be readily accepted as a qualified weldor wherever he went.

The welding industry has long needed a free interchange of weldors between jobs. It is high time that the industry wakes up and does something about that need. We will have only ourselves to blame, if we allow the practice of welding to be fouled up by state laws like the one proposed for California. Laws directed by people who may be wholly ignorant of the value of welding and its contribution to our national welfare.

Only ourselves to blame!



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FOR more than a quarter of a century you have known these fine lenses by other names. They are the products of Pennsylvania Optical Company, one of America's leading makers of ophthalmic and industrial lenses, acknowledged to be among the finest available. You just cannot buy better lenses at any price.

NOW AVAILABLE

Direct from the manufacturer at substantial saving. The Penoptic line includes a complete range of welding, cover and safety lenses. Write or telephone your order to

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*PENOPTIC is the trade name of Pennsylvania Optical Company

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Remember the trade marks "tt" and "TUBE-TURN" are applicable only to products of TUBE TURNS, INC.

Make piping permanent and leakproof

Write Dept. H-5 for free booklet listing properties of pipe and welding fitting and flange materials.

PIPING PERMANENCE is always important but now, more than ever, any installation of piping should be leakproof, maintenance-free and have extra long life. A piping system, big or small, is only as strong as its weakest component. That's why welding fittings, for example, should be specified with care.

TUBE-TURN Welding Tees are drawn from seamless tubing to a barrel shape—the shape every tee wants to assume under pressure. This feature, together with the generous crotch radius and thickness, explains why TUBE-TURN Welding Tees withstand more pressure without yielding. Bursting pressures obtained in tests of representative fittings have averaged more than 25% higher than required by standard codes. Here's extra quality at no extra cost.

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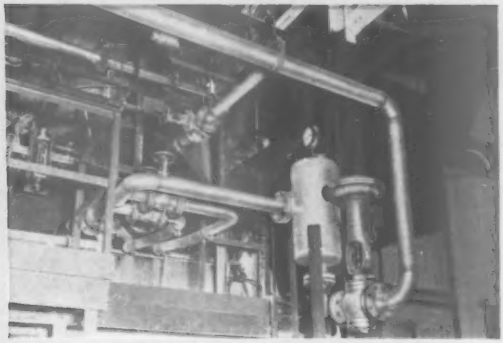
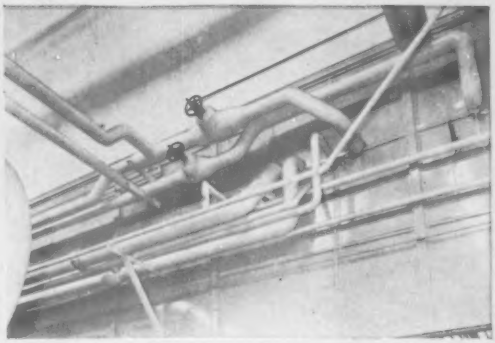
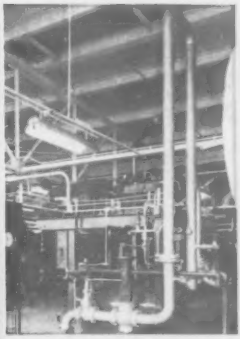
Penicillin processor welds stainless steel piping ½" and up



Advanced facilities in plants and laboratories help Eli Lilly and Co., Indianapolis, turn out a high volume of pharmaceuticals, biologicals, and antibiotics. This new filtration unit in the penicillin processing system uses 3" and 4" Type 316 stainless steel—chosen to resist corrosive action. Welded system with TUBE-TURN Welding Fittings and Flanges was chosen to provide maximum strength and eliminate leakage.

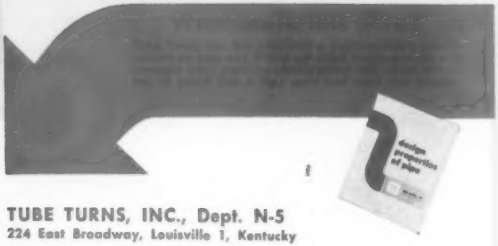


Neat appearance of insulated lines demonstrates simplicity of welded piping. Insulation was applied quickly over pipe and TUBE-TURN Welding Fittings, with no awkward joints to work around. Maintenance men know that insulation will last, with no leakage to cause deterioration. Cleanliness and neatness are prime requirements in Eli Lilly plants.



Up in the air goes a loop welded with 6" pipe, joined with TUBE-TURN Welding Fittings and Flanges. Structural strength here is a must. In this fermentation tank where life-saving penicillin is made, tiny lines of ½", as well as larger sizes, are welded. Comparable modern facilities are provided for making streptomycin and other products.

Lines to process vessel fit neatly into a small space when TUBE-TURN Welding Elbows make the turns. Eli Lilly engineers specified process piping for optimum flow conditions, compactness, and elimination of leakage.



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TUBE TURNS, INC.
LOUISVILLE, KENTUCKY

R. B. SWOPE, president and chairman

HEADQUARTERS building at Bladensburg, Md. Territory served by Southern Oxygen stretches into ten states along the eastern seaboard

R. McMILLAN, vice-pres. and gen. mgr.

Seaboard Distributor

Southern Oxygen once had only three customers. Today it can boast of a $4,500,000 volume in gases, welding equipment and supplies. Here's the story.

LAST year the Southern Oxygen Co., Inc., produced and sold approximately 70,000,000 cu ft of oxygen, 25,000,000 cu ft of acetylene, 7,000,000 cu ft of hydrogen, 3,500,000 cu ft of nitrogen. Its carbon dioxide sales exceeded 1,500,000 lb, and the propane division exceeded 2,500,000 lb of liquid fuel gas.

The company's industrial sales of welding equipment and supplies exceeded the million-and-a-half dollar mark during 1950 and promise to exceed that figure during 1951 by at least 30%.

The medical division, which includes sales of all medical gases, equipment and supplies, is now approaching the million-dollar class.

To sum it all up, the total sales of the company reached $4,500,000 during 1950, as compared to $3,650,000 for 1949. Estimated sales for 1951 are $5,500,000.

Pretty good going, don't you think?

Pentagon Took Plant

In its 35-year history, Southern Oxygen has had to face the usual run of distributors' problems and one or two rather unique problems of its own. Perhaps the most serious occurred during the latter part of 1941 when the United States government took over the property on which the company's Arlington, Va., plant was located to build the Pentagon building.

This vast project of the War Department made it necessary to remove and relocate the company's general office and main plant. Southern Oxygen met the emergency with the purchase of a large tract of land at Bladensburg, Md., adjacent to the District of Columbia boundary. The erection of a new plant was begun early in the spring of 1942. By September of the same year, in spite of almost insurmountable difficulties (together with the necessity of keeping up plant production as much as possible), the transfer of equipment to Bladensburg was successfully effected.

The company's present three plants are located at Bladensburg, Greensboro, N. C. and Kingsport, Tenn. District plant offices are strategically located in the trading areas of each plant, and their requirements of the company's products are supplied through a fleet of big delivery trucks.

The Bladensburg plant serves district offices located in Baltimore, Md., York, Pa., Richmond and Norfolk, Va., and Vineland, N. J.

The Kingsport plant serves district offices located at Bluefield, W. Va., Knoxville, Tenn., Roanoke, Va., and Asheville, N. C.

The Greensboro plant serves those district offices located at Raleigh and Winston-Salem, N. C.

It all maps out quite a sizable territory, centering around Washington and stretching from Pennsylvania to North Carolina and from the seaboard to West Virginia, Kentucky and Tennessee. Each of the three main plants services several subbranches, located throughout the trading areas. Moreover, each district office is equipped with delivery trucks for local delivery as well as with specially designed road trucks operated by driver salesmen.

New Office at Richmond

Last fall the company purchased property in Richmond, Va., and began the construction of a modern district office and branch in the former capital of the Confederacy. Plans were carefully drawn in an effort to consolidate all of the various ideas that had been accumulated during many years of experience.

Southern Oxygen is very proud of its new Richmond outlet, considered by those who have inspected it to be one of the most convenient and well-planned structures of its kind ever built. It is 100% fireproof. The loading dock allows the tractor-trailers supplying this branch to unload and load without interruption to the service of local trucks. The branch has a dual entrance and is completely sur-

CAFETERIA at Bladensburg plant. In background toward right, President Swope is lunching with the boys

SHOWROOM in new office at Richmond, Va., features open-shelf displays of welding equipment and supplies

rounded by an open driving and parking area. Because of these facilities, the new branch has attracted additional business since the day it was opened.

The company plans to use the Richmond district office and branch as a model for starting a chain of identical units throughout its territory. The second unit will shortly be constructed at Raleigh, N. C.; the third is contemplated for York, Pa., within the next year.

About five years ago, Southern Oxygen established a district office and branch in Philadelphia. This branch sells only oxyacetylene and arc welding equipment and supplies. None of the gases which the company manufactures or distributes are handled through this outlet. However, Southern Oxygen Co. is enjoying a highly satisfactory sales volume of welding products in the Quaker City. Good salesmanship, sound advertising and excellent backing from suppliers have made the Philadelphia venture a successful operation.

Starts with Three Customers

Southern Oxygen Co., Inc., is exactly the same age as THE WELDING ENGINEER, both being established in 1916. Founder Robert B. Swope at first had only three customers for the output of oxygen and hydrogen gases from his initial small electrolytic plant at Arlington, Va., and deliveries were made with an old rebuilt Cadillac touring car.

A few years later, Mr. Swope moved his plant to a new location on the main highway at Alexandria, Va., and began the production of acetylene gas. A liquefaction column was also purchased for the production of oxygen. The original electrolytic plant was expanded to meet the growing demand for hydrogen.

During the early 20's, the company helped in the development of the oxygen tent and conducted extensive research in that field. The first portable oxygen tent equipment, with a circulating and cooling system, was produced and leased to many of the hospitals in the Washington area. The company was thus one of the early pioneers in promoting the use of oxygen in hospitals for the treatment of pneumonia, heart disease and other respiratory difficulties.

In 1931, Southern Oxygen began the manufacture of carbon dioxide gas for industrial and medical use. It also installed equipment for the manufacture of nitrogen gas.

The next significant year was 1935, when facilities were again expanded through the construction of an oxygen and acetylene plant at Kingsport in eastern Tennessee. The success of this venture was assured in less than a year. A good portion of the business acquired for the new plant was obtained through the promotion of welding processes in the coal fields of West Virginia, Virginia and Kentucky. Trained welding engineers with a background of practical experience were sent into the field to instruct potential customers in the art of welding, both arc and oxyacetylene. The result was hundreds of new users.

During the early part of 1939, the company recognized the growing demand in its territory for bottled liquid fuel gas, and began to offer its own propane gas and allied equipment for domestic and industrial use. This division of the company has continued to grow through the years.

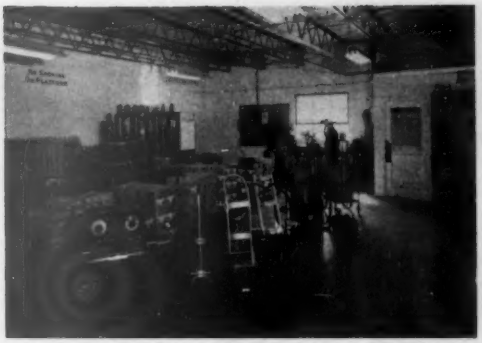
We have already mentioned what happened in 1941 when the federal government took over the property on which the company's Arlington, Va., plant had stood for so many years. At Bladensburg, the company successfully re-established its plant and office in the Washington area.

The war years required the company to expand its production facilities on all gases, and especially so with respect to those required by the rapidly growing medical division. Hydrogen gas plant facilities were also materially increased.

New Plants Added

In the early part of 1948, the company began construction of a new oxygen and acetylene plant at Greensboro, N. C. This plant was completed and placed in operation the latter part of the same year. The initial production facilities were sold out within less than twelve months after operations began.

During the past year, the demand for gases for industrial and medical uses has pyramided to an unprecedented level, requiring a new program for the expansion of plant facilities. At this writing, plans have been completed and construction is under way to expand the oxygen facilities at both Kingsport and Greensboro. Additional facilities begun last summer for the production of oxygen and hydrogen at the Bladensburg plant are now in the final stages of completion.



STORAGE AREA at Richmond. This building will serve as a model for a chain of identical district offices

I.B.M. CONTROL system keeps track of the thousands of cylinders needed for oxygen and other gases

Last summer also saw an additional plant constructed at Bladensburg for the purpose of hydrogenating and refining edible and inedible oils. This new addition will require large quantities of hydrogen.

The present demand for the company's products, already augmented by the National Defense effort, requires all of its production facilities to operate on a 'round-the-clock basis, seven days a week. The present expansion program should materially assist in meeting the demand for oxygen, acetylene and other compressed gases in the areas vital to our Defense Program.

Men Who Manage It

Founder Robert B. Swope is still a very active figure in the business as president and chairman of the board. Mr. Swope is a graduate of Lehigh University with the degree of Electrical Engineer. While serving as a commercial engineer with the Potomac Electric Power Co., of Washington, D. C., he learned of the process of oxygen manufacture that led him to install his first small electrolytic plant in Virginia.

He rates his most outstanding contribution to the industry as the development of an oxygen tent back in the early 20's. He also developed an infant respirator during the same period, which today has become standard equipment in practically every hospital in the world.

Mr. Swope has been active in the various associations connected with his industry, serving as chairman of the Washington Section of the American Welding Society, director of the former National Oxygen & Acetylene Association, president of the Independent Oxygen Manufacturers Association and of the International Acetylene Association. He is on the board of the Compressed Gas Association, Inc.

Mr. Swope enjoys hard work. His example in that respect probably has inspired much of the success of the company through the loyalty and teamwork of its 350 employees.

Vice-President and General Manager R. P. McMillan joined the company in 1923 as shipping clerk. Several years later he obtained leave of absence to enter the University of Maryland, but continued to work for the company during week ends, holidays and summer vacations. He returned to the company on a full-time basis in February, 1928, in the capacity of a salesman.

In the fall of 1935, McMillan was made assistant sales manager. During the next several years he was engaged in the development and expansion of the company's operation in the Kingsport, Tenn., area. In 1939, he was made general sales manager and in December, 1944, was appointed vice-president and general sales manager. He also became assistant general manager and a director. In March, 1949, he was made vice-president and general manager of all company operations.

Mr. McMillan is a member of the board of directors of the National Welding Supply Association and is also a member of the AWS public relations committee. He possesses a boundless store of energy and enthusiasm, which has contributed a great deal to the growth of the company.

W. N. Howison, secretary and director, came to the company in the spring of 1934 as credit manager. In 1942, he was elected assistant secretary and office manager. In December, 1944, he was elected to the board of directors and placed in the position of secretary.

Through Mr. Howison's direction, the company's modern accounting system has kept pace with its rapid expansion and growth. The entire accounting system, including the accounts receivable as well as inventory and control of cylinder equipment is handled by an I.B.M. systems control.

Robert L. Swope, son of Robert B., is the chief engineer of the company. "Bob," as he is known by his fellow employees, began his career with the company during the summer months between the years 1930 and 1935 while he was attending Lehigh University. Upon his graduation with an engineering degree in 1935, he went to work on a permanent basis as an assistant operator in the Arlington, Va., oxygen plant. In the spring of 1936, he began the research for the electrolytic equipment that the company is now using for the production of hydrogen and oxygen gases. In 1941, he was appointed chief engineer and in December, 1944, treasurer and a member of the board of directors.

What It Sells

As a welding distributor, Southern Oxygen stocks complete lines of oxy-acetylene and arc welding equipment, electrodes, filler rods and supplies. It handles a group of nationally known

FLEET OF OVER 100 trucks and tractor-trailers is probably unequalled anywhere else in the industry

DIESEL-POWERED tractor hauls an aluminum trailer. The lighter weight of aluminum increases the payload

lines of stainless and alloy steel electrodes, oxyacetylene welding and cutting torches, brazing alloys, silver-brazing alloys, hard-facing products, arc welders, electrode holders, plow points, goggles and welding lenses and many other products. The company is also a distributor for emergency lighting plants, which are sold to hospitals, rescue squads and industrial plants to provide service in case of power failure.

The inventory carried is normally in excess of the three-quarter million dollar mark, which guarantees an adequate stock at all times. A strict inventory control is maintained, and each plant, district office and branch is required to report each month to the main office any items classified as surplus or that have been in stock in excess of 60 days. This method has proved very effective in keeping inventories in a liquid condition.

Sometimes the company purchases large quantities of materials in bulk, which are delivered to the Bladensburg stockrooms and then broken down in proportionate quantities and reshipped to the various outlets via its own trucking system and commercial carriers. For example, plow points are received from Perry, Iowa, in trailer load lots, as are many other items of a similar type where quantity purchase and handling is found to be more favorable.

How It Sells

The company's sales department is managed by two sales managers, both of whom have grown up with the organization. Raymond P. Roberts is sales manager of the Washington division, and W. Howard Snuggs has charge of all sales in the Kingsport and Greensboro divisions. Under supervision of these two capable sales managers, 22 industrial and medical sales representatives sell the company's products to more than 30,000 customers. In addition, a large fleet of service trucks, operated by trained driver-salesmen, makes periodic calls on rural customers.

The sales department is divided into two divisions: the industrial division and the medical division. Both of these are under the two sales managers.

Each salesman in the industrial division has a specific territory and is held responsible for all sales in his respective area. The greater majority of these men are also in charge of district branch offices, out of which they operate. The district branch offices are equipped with office and counter-sales personnel, including office managers, invoicing clerks, truck drivers and driver-salesmen. The industrial sales force must work with the driver-salesmen who operate in their territory, supervising their calls and assisting them.

Each district office tabulates the sales of gases and equipment of the driver-salesmen and forwards detailed sales recap sheets at the end of each month to the sales manager in charge of the area. Daily sales reports are required of each salesman. These reports are carefully read by one of the two sales managers and recorded for future use in follow-ups.

The field industrial salesmen are augmented by several welding engineers, who are capable of assisting customers with welding problems.

The medical division, though also under the management of the two sales managers, is supported by a medical technician designated as the director of sales of medical equipment and supplies. Gilbert Abbe holds this position. Mr. Abbe has, himself, contributed to the development of several new oxygen therapy appliances.

The great majority of the company's products are sold direct to the consumer. It does, however, sell a portion of its gases and equipment through distributor outlets.

Sales personnel are paid on an incentive basis, including the sales managers. Industrial salesmen are paid a base salary with commissions on sales of equipment and supplies. The company pays all travel expenses, providing transportation for its entire sales force through a fleet of company-owned sales cars. It also pays for hotel bills and meals, including such expenses incurred by the driver-salesmen.

The company does not permit competition between its salesmen and the driver-salesmen who operate in the same territory. The commissions are figured on a coöperative basis that eliminates this possibility.

Advertising and Display

The company maintains an adequate, efficient advertising department to provide catalog and advertising material for its industrial and medical divisions. Pieces of direct-mail advertising literature are regularly distributed. Salesmen and driver-salesmen are also required to

(Continued on page 58)

BAILEY BRIDGES are assembled within a few hours to speed troop advancements

CECO EMPLOYEES went to a welding school at the company plant. In two weeks they could handle jobs on the Bailey bridge assembly line

Ceco Builds Bailey Bridges

Out of the paper work and into actual production, Ceco Steel Products Corp. provides a model for other companies planning conversion to defense orders.

BY CLYDE B. CLASON

ONE OF THE first of Chicago's many large metalworking plants to convert to defense orders, Ceco Steel Products Corp. is now fabricating Bailey bridges in continuous production.

A floor space of 30,000 square feet in the two-block-long Ceco plant No. 1 in the western Chicago suburb of Cicero has been set aside for the assembly-line production of Bailey bridge sections. As the bridge sections are carried along by overhead conveyor, they are assembled, tacked, finish welded, drilled, cleaned and painted in successive stages. Finally, they are loaded into railroad cars and shipped to Army Engineer depots to be stocked or sent overseas.

A British invention, the first Bailey bridge was built in 1940. It was widely used in World War II and is today being used by our forces in Korea.

Bridges While You Wait

All Bailey bridge components, whether American or British, are interchangeable. Basically, a Bailey structure consists of trusslike standard panels for the sides, end posts to anchor the bridge on either side of the stream and steel beams (transoms) to hold the timber flooring.

By pinning together successive panel sections, both horizontally and in a vertical direction, a strong steel bridge can be erected within a few hours to span rivers or ravines for advancing task forces. An entire bridge can be erected on one bank of a stream and pushed over to the other bank. Another use is to replace structures knocked out by shelling or air bombardment in order to keep supply lines open. As a replacement, the Bailey bridge proved so satisfactory that most of those erected in Europe during the war are still in active service today. Load carrying capacity of the structure is readily adaptable to the particular task at hand.

Ceco received its contract from the Army Engineer Corps last September. Three months were required to set up the assembly line, build the needed fixtures and train employees to do the work. To its Bailey bridge making, the company has added the production of landing mats to form aircraft runways and the manufacture of screw posts on which to string barbed-wire defense lines. All of these war items, including the Bailey bridge, were produced by Ceco during World War II.

Concrete Engineering Business

"Ceco" is the abbreviation of "Concrete Engineering Co.," the name under which the firm was originally known. The company was organized in 1912, in Omaha, by C. Louis Meyer to promote a new system of concrete joist floor construction involving the use of removable pan-like cores called "steelforms." These were rented to building contractors by Mr. Meyer, who invented and patented the system. Throughout the years Mr. Meyer and his company did a great deal to encourage the use of reinforced concrete as a structural material.

"From the beginning, Ceco has served architects, engineers and builders in the engineering design of reinforced concrete structures," asserts the company's booklet, *Who We Are*, prepared for distribution to visiting salesmen. "Early in its development, it was natural for Ceco to also furnish and fabricate the reinforcing steel required in these structures. Today it is the largest independent fabricator of concrete reinforcing steel in the country."

TACK WELDING bottom chord member together after it has been assembled and clamped in a jig. Note curtain

ON OTHER SIDE of curtain, bottom chord is finish welded in positioning cradle in front of conveyor

WASHER is welded to the bolt plate on above revolving fixture

Ceco has widely diversified its services and products, which now include steel windows and doors, metal-frame screens, aluminum storm windows, combination aluminum screen and storm units, open-web steel joists, steel roof deck, metal lath, welded steel fabric and metal roofing accessories. These and other Ceco products have been used in thousands of homes, apartment houses, factories, stores and institutional buildings. Ceco reinforcing steel has also played a prominent part in the concreting of highways and bridges.

To these peacetime products, Ceco has now added Bailey bridge sections. The Bailey bridge production, like the rest of the work at Ceco's big plant No. 1, comes under the supervision of R. J. Anen, works manager. The contract administration, fabrication, inspection and shipment are under the direct supervision of the Chicago district Corps of Engineers, U. S. Army.

The writer is indebted to Mr. Anen for the information that follows.

The fabricated panels are approximately 5 ft high by 10 ft long. The end posts, also 5 ft high, are of two basic types—male and female—to fit at opposite ends of the bridge.

The upper and lower chord members of the panel assembly also have male and female ends that lock to the ends of other panels and to the anchor posts. The male end is a steel casting, the female end a steel forging. When a male coupling has been fitted into its female counterpart, the two are locked into place by means of a round steel pin. This construction requires the precision drilling of holes at each upper and lower end of the panel. Besides these four panel pin holes, four other holes are drilled —two in each chord—for the bolts that will fasten one panel on top of another and to a panel above it.

When completed, one panel is much more like another than the proverbial two peas. They match within 0.005 in. of their critical hole diameters.

Subassembly Operations

Components of a panel consist of top and bottom chord members (prefabricated subassemblies), three vertical members (also subassemblies) and eight diagonal members, which are simply 3-in. channels cut to proper length.

The chord members are fabricated from 4-in. channels, steel forgings (female ends), steel castings (male ends), plate for spacers and lock plate and steel "chord blocks" 1¼ by 3 in. In these blocks, the four chord pin holes will be drilled after the chord has been finish welded.

To form the panel uprights, gusset plates and lock plate forgings are welded to 3-in. channels. Other subassembly operations include the welding of two minor subassemblies on a rotary fixture. One of these, called the pintle plate, has a pintle or pivot pin about an inch in diameter to be welded into a hole. The operator inserts the pintle and places the plate on the revolving fixture; then all he has to do is hold his electrode at a constant distance to maintain the proper arc length. The lock plate washer is similarly welded onto a ¼-in. plate. This time-saving idea traces back from World War II.

The production line reveals many other clever ideas for fixtures, work movements, etc. All such design work was done under the supervision of R. W. Janda, works engineer.

Fabricating Chord Members

The top and bottom chord members are assembled in fixtures, clamped and tack welded. This work is done by one weldor and four assemblers. There are three fixtures for the assembly of top chords but only two for the bottom chord, which requires slightly more work. After the chord member—top or bottom—has been assembled and tack welded, it is removed from the fixture and welded in

CHORD MEMBERS are ground smooth after welding to prepare surfaces for drilling of the chord bolt holes

JIG for panel assembly clamps upper and lower chord members to three uprights and eight diagonal channels

a positioning cradle attached to the side of the conveyor. The weldor keeps turning the chord as he works so that he will do all of his welding in the downhand position. Finish welding of the two chord members takes the full time of eight weldors per shift.

The conveyor carries the chord members to a table for grinding. One man with a pneumatic grinder smooths off the top and bottom surfaces so that the chord will lie flush when it goes to the drill press.

Eight Holes per Panel

As we have previously mentioned, there are eight holes to be drilled in every panel: four end pin holes and four chord bolt holes. The chord bolt holes are finish drilled after the welded chord member has been ground smooth; the end pin holes after the whole panel has been welded together. Hole centers must be held to a tolerance of $\pm 1/32$ in. and hole diameters to 0.005 in. in order to assure complete interchangeability of bridge sections.

Because of excessive welding on its bottom side, the bottom chord member emerges from its finish welding in a slightly bowed condition. It is straightened by the simple expedient of welding pintle plates to the top side. The amount of welding is just sufficient to overcome the previous distortion, and the chord member emerges perfectly straight.

The pintle plate, one of the subassemblies previously referred to, serves to hold and locate the transom or floor beam when the bridge is put up in the field.

The upper and lower chord members are assembled and tacked with verticals and diagonals at three panel assembly stations. This work is done by four assemblers and one tack weldor.

The web design is that of an oblong divided into two squares with a diamond in each square. The three verticals and eight diagonals that make up this pattern are fabricated from 3-in. channels. The diagonals are welded to the gusset plates that were attached to the vertical members in a previous subassembly operation.

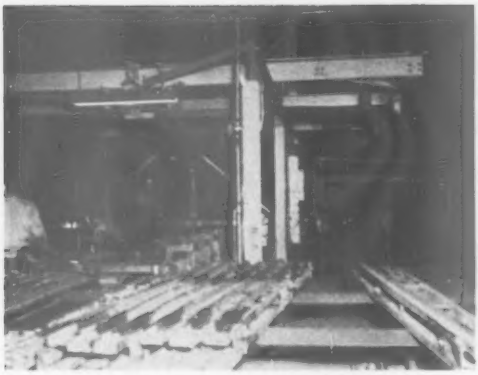
When the panels are welded and tacked, they are suspended from conveyor hangers that clamp to the center of the two outer uprights. An overhead conveyor then takes them in charge.

The assemblies are cross transferred (at right angles to the direction of the conveyor line) to the finish welding stations. There are four stations for finish welding—one more than for assembly because of the longer time required to do finish welding. The loop where the conveyor line reverses direction provides a convenient accumulating area when the number of assembled panels gets ahead of the weldors.

Finish welding is aided by a most ingenious trunnion fixture, one of which is located at each station. Two lengths of 2-in. steel pipe are embedded in the concrete floor to stand upright. These vertical posts are in line with each other and are spaced apart a distance slightly greater than the

TRUNNION fixture aids positionings of panels for finish welding

STANDARDS help support panels when they are turned horizontally



CONVEYOR LINE: panels are hung from hangers shown at the right. Finish welding stations are on the left

FOUR END HOLES for the panel pins are drilled in one operation on this press to accuracy of 0.005 inches

length of the panel. At the top of each pipe is fitted a tee, which provides a bearing for a retractible plunger. The plunger engages an opening in the clamp on the conveyor hanger. When both plungers are engaged with their respective clamps, the panel may be revolved a full 360 deg around a vertical circle. It may be stopped at any position and locked in place by cotter pins so that all welding can be performed downhand.

When the panels are in a horizontal position, parallel to the floor, they are supported additionally by two standards, one on each side. Each of these is simply a flat base welded to an upright. The standards are comparatively light in weight and may be shifted under the panel or moved away according to positioning requirements.

Two men work at each welding station—a total of eight finish weldors.

Drilling and Clean-up

From the welding stations, the overhead conveyor takes the panels to another drill press. The four end holes for the panel pins are finish drilled in a single operation, using two of the previously drilled chord block holes for location. As with the chord block holes, tolerances must be within ± 1/32 in. for the location of hole centers and within 0.005 in. for hole diameters. An inspector checks hole diameters with a two-ended "go and no-go" gage. One end, just under the required hole diameter, should fit into the hole, but the other end, just oversize, must not.

The panels move along the assembly line to the clean-up station. Eight women workers, armed with pneumatic chippers, remove all the splatter and slag from the welds. These ladies displayed a great deal of zest for their noisy job and appeared to the writer to be among the hardest working people in the plant.

After slag cleaning, the welds are inspected visually, and any found defective are chipped out and rewelded. In addition to the visual inspection of every panel, every 15th panel is removed from the conveyor and given a complete dimensional check with government gages. This work is done by a Ceco inspector under Army Engineer supervision; Army Engineer inspectors work in shifts so that at least one will be on the floor during any hour of the day or night.

After inspection, the panels are thoroughly wiped in order to remove all traces of oil left from the drilling. This work is also performed by women. After wiping, the panels are ready for spray painting. First, they are given an olive drab priming coat and then a light-gray finish coat. The painted panels are air dried and then stacked for shipment.

End posts are fabricated in a manner much less complex than the panel fabrication. The components are 4-in. channels, ½-in. plate, ¼-in. plate and a steel casting. The casting is for the bearing block on which the post (and consequently the weight of the entire structure) rests. These various materials are assembled in jigs and tack welded; they are then taken out of the jigs for finish welding, done similarly to the welding of the panel chords. No particular problems were encountered in either the welding or the assembly of end posts.

Ran a Welding School

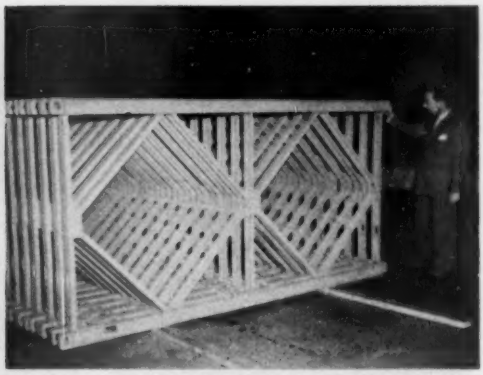
Of the employees engaged in the fabrication of Bailey bridge sections, nearly one third are weldors. To obtain the large number of additional arc weldors needed, the company conducted a welding school in the plant during the first ten weeks after the start of the contract. "Students" were Ceco employees who had the desire to learn welding and were able to qualify as likely candidates. They were chosen from all departments of the company, with selection being made on a basis of length of service and work record. Unskilled workers were picked whenever possible so that only unskilled help would be needed for replacements on civilian goods production lines.

Out of 125 applicants, about a hundred men were selected to receive welding instruction. Of these, 80 passed the qualification tests required by the Corps of Engineers and went to work as weldors.

Chuck Mulrain, the company's full-time welding instructor, was in charge of the training when Ceco operated the school. Now that a sufficient number of trained men have been secured for production, Mulrain's instruction activities are confined to the training of replacement workers and the giving of help to production weldors stuck on tricky problems.

For his school, Mulrain curtained

WOMEN WORKERS will clean up the bridge parts before they are painted. This lady is working on an end post



PANELS are spray painted at the last station on the assembly line, air dried and then stacked for shipment

off eleven welding booths and moved in ten a-c welders and one d-c welder. The latter was used largely to explain the differences that would be found in a-c and d-c welding. Though the production welding would all be a-c, Chuck felt that the men should know how to operate a d-c welder.

Mulrain gave the candidates some screening in order to weed out the obviously unfit. However, he leaned over backward to give a man a chance to make good. In general, he says, men over 45 are too old to make good weldors as they cannot hold their hands steady enough. Passing to the other end of the age scale, it obviously wasn't a paying proposition to train young men in the draft-age bracket. Hence most of the trainees were men in their thirties and late twenties.

No women weldors have been trained—as yet. However, women were hired for other operations on the Bailey bridges such as running drill presses and clean-up work, so it is probably only a matter of time until women weldors are again working at Ceco as they did during World War II.

Mulrain's instructions began with how to strike an arc. If you have an a-c welder, he explained, you merely lift the electrode, but with a d-c machine you have to scratch the electrode along the plate. When the weldor could strike a satisfactory arc, he was taught how to run a bead, how to splice a bead, how to lap a bead and how to make a fillet weld and a weave. The course also included information on such important topics as the differences between a-c and d-c welders, the differences between straight-polarity and reverse-polarity electrodes, how to hook up welding cables and other matters that a young weldor ought to know.

The instruction given was confined to the downhand position and limited to the welding of mild steel. The men were thus trained for one operation as all-around welding skill was not a requirement of the production line.

In the early stages, beads were laid on scrap material, but after the trainee had gained some degree of proficiency he was put on useful jobs such as making expansion joints, welding on anchors to curb angles, fabricating light brackets, conveyor fixtures, etc. Every effort was made to give the trainee work of $\frac{1}{8}$ in. and greater thickness since he would be engaged in such material when he graduated to Bailey bridges.

The learning time varied rather markedly from man to man. Mulrain encouraged the brighter students to go ahead as fast as they could. The welding school extended over a period of $2\frac{1}{2}$ months, in which all the weldors needed were trained.

As soon as a man was deemed ready for it, he was given the standard qualification procedure of the American Welding Society. To pass the test, he had to make butt and fillet welds in two sets of $\frac{3}{8}$-in. test plates 5 by 6 in. Plates for the butt weld were spaced 3/16 in. apart and beveled 30 deg for a single-V joint. Plates for the fillet weld were spaced 15/16 in. apart. Both sets of plates were welded with a back-up strip.

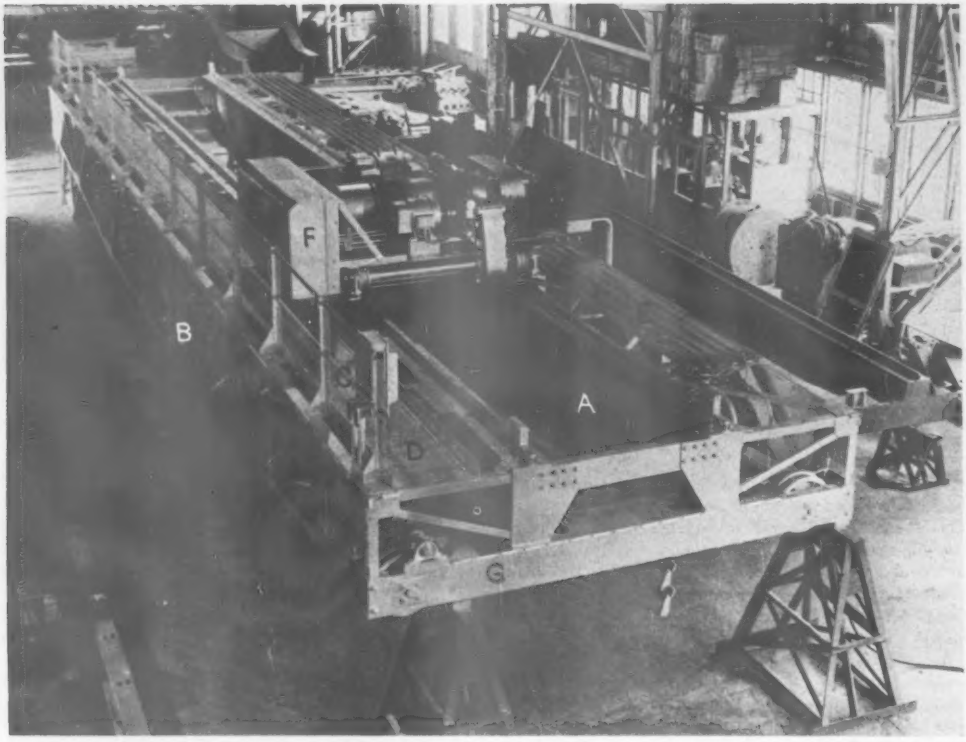
When the grooves had been filled with weld metal, the plates were cut into $1\frac{1}{2}$-in. strips for guided root-bend (soundness) tests. The weldor was disqualified if a crack showed up that was more than $\frac{1}{8}$ in. measured in any direction. He could, of course, go back for more training and take the tests over again, as many did. Eventually, all of the 80 men who stuck it out passed their tests.

Ceco's training program was carried on at the same time war-work production lines were being set up. This has resulted in the easy transfer of personnel of proved worth to defense jobs requiring skilled workers. As a program of partial conversion to military work in these troubled days, it might profitably be studied by other companies.

Flash Welds Window Frames

EXCEL CORP., Elkhart, Ind., has achieved higher production by using two flash-butt welders for the manufacture of trailer coach window frames. Greater accuracy and fewer rejects have also resulted, according to The Taylor-Winfield Corp., Warren, O.

The two welders are mounted on a common base, with one machine adjustable as to position for varying sizes of work. Preformed sections of cold-rolled stainless steel from 0.032 to 0.050 in. thick are placed in special dies on the two welders, and precision miter welds are made simultaneously. Production is at the rate of up to 140 sash (280 welds) per hour.



1—COMPLETED CRANE indicating breakdown into component parts: (A) crane girder solid web; (B) outrigger girder; (C) hand rail; (D) walkway; (E) aluminum contactor bus bars; (F) trolley hoist; (G) end truck assembly

15-Ton Aluminum Crane

This aluminum overhead crane weighs 42.5% of what a steel crane of same design would weigh. The reduction in weight means that lifting capacity is increased.

BY W. F. WALKER
General Manager, Provincial Engineering Ltd., Niagara Falls, Ont.

A WELDED overhead traveling crane is believed to be the first aluminum crane in the world. Having a 15-ton capacity and a span of 55 feet, it was designed and fabricated by Provincial Engineering Limited, Niagara Falls, Canada, using inert-gas-shielded arc welding exclusively.

Crane girders and trucks, walkway, hand rail, bridge conductors, trolley frame and all other structural parts usually made of steel are made of aluminum alloy. The crane is presently in operation at the Aluminum Company of Canada, Kingston, Ontario.

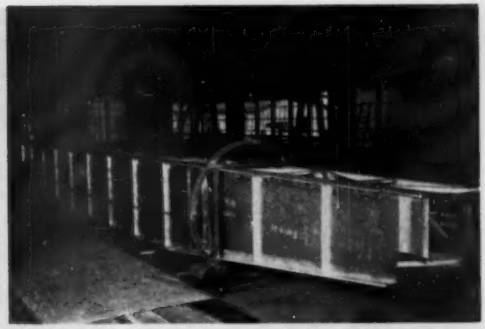
Photos and data courtesy of Linde Air Products.

Material and Welding Details

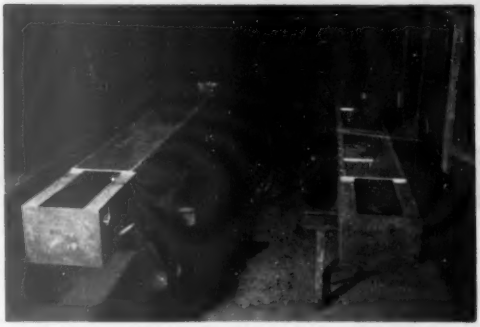
The aluminum alloy used in the fabrication of the crane was 65 ST, which has a typical ultimate tensile strength of 45,000 psi and a modulus of elasticity of 10,300,000 psi. Before commencing work on the crane, numerous tests and procedure experiments were made by Provincial Engineering to determine the strength of welded joints and the annealing effect on the material caused by the heat of welding. Average static test results for ultimate tensile strength values of welds were 23,000 and 18,000 psi for transverse butt welds and longitudinal fillet welds, respectively. Despite these low values in comparison with steel welds, only a normal amount of welding was necessary as the vertical and horizontal shear stresses were quite low in the design adopted.

All welding was done with a 700-amp inert-arc torch, using 5/16-in. and 3/8-in. tungsten electrodes. Details on argon consumption and linear footage welded are included in the general summary at the end of this article. Most welds were ½-in. and ⅝-in. butt and fillet welds, made

2—MAIN BRIDGE girder (top view). Note rotating cradle that positions girder for all downhand welding



3—ANOTHER VIEW of main bridge girder. The webs are ½-in. plate; web stiffeners are ⅜ by 4 in. bars



4—END TRUCKS are driven by main bridge drive. Frames are made of 10-in. channels and ½-in. plates

5—HOIST TROLLEY chassis. Note reinforcements for web and tension flange. Hole is for sheave pin

Inert-Arc Welded

with filler metal from an aluminum-alloy rod. The welding current varied from 380 to 450 amp and was obtained from an a-c source of two 300-amp transformers hooked together in parallel. Intermittent welding was used throughout; the welds were 5 in. long and were spaced on 12-in. centers. Cracks that occurred in some of the weld craters were repaired by rewelding after the work had cooled.

The completed crane assembly is shown in Fig. 1. Letters indicate the component parts. Note particularly, the aluminum bus bars for the bridge trolley and the aluminum power pick-up shoe.

Figs. 2 and 3 give details of a main bridge girder. At the right of Fig. 2 is shown a bridge girder web plate and hanging up at the top of Fig. 3 a lattice-work outrigger or auxiliary girder. Flanges of the main bridge girders are 1 by 12 in. extrusions; the webs are cut from ½ by 60 in. rolled plate, and the web stiffeners are ⅜ by 4 in. bars. The lattice-work outriggers form an auxiliary girder and were fabricated separately and joined to the main girder as a final assembly.

To facilitate the work of welding, the components of the bridge girders were lightly tacked together and then placed in rotatable cradles (Fig. 2) to enable finish welding to be done in the downhand position.

The end truck frames (Fig. 4) are composed of 10-in. channels and ½-in. plates, and the components of the hoist trolley chassis (Fig 5) are extruded 10-in. I-beams and 10-in. channels.

Distortion Control

Distortion was controlled by:

(1) The conventional use of stiffbacks and spreaders;

(2) The use of aluminum chill bars (solid bars of aluminum dipped in water and placed on the metal immediately after welding); and

(3) Close control of the base metal temperature with temperature-indicating crayons. Crayon marks were made at a distance of 4 in. from the weld. When the base metal reached 400 F at that point, the weldor quit and moved to a new, cool section.

Distortion control was so good that compensating sheave pins in the hoist trolley chassis (see Fig. 5) could be hand turned although the holes were machined to size prior to assembly.

(Continued on page 31)

1—MAIN PIT for piping and underbody work. Six individual pits are at right

2—JIB CRANE and a two-ton hoist position a tank trailer at one of the work stations in tank welding shop. Undercarriage is on top

Welding Aids Truck Body

Advance Auto Body Works, Los Angeles, utilizes production techniques to turn out custom bodies. Secret of the flexible operation is lots of "elbow room."

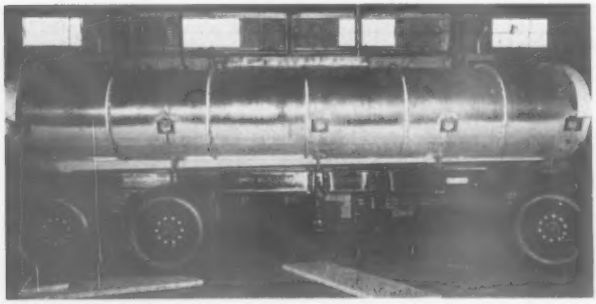
BY FRED M. BURT

JOE MORGAGNI and three other men started what is now the Advance Auto Body Works (one of the two largest auto body building plants on the Pacific Coast) in 1919. There was then relatively little welding done in the construction of truck bodies; today welding and allied operations have preeminent position in such production.

This is true not only in new construction but also in repair and rebuilding jobs. Restoration of truck bodies would be excessively expensive if badly deformed parts could not be cut out so that new parts or new subassemblies could be welded in as replacements.

MODERN NEW PLANT

The company moved into its present plant at 4950 Anaheim-Telegraph Road, Los Angeles, in 1947. The new plant has 58,000 sq ft under roof on a 4½-acre site and employs an average of 80 persons. It is said to contain more machine tool equipment than any other body-building plant on the Pacific Coast. The front building, a 120 by 200 ft structure,



6—INSULATED TANK to transport 3,000 gallons of hot oil. Four inner shell sections have been welded into a single 20-ft.-long tank

7—BACK-UP RIBS on shell will hold a 2-in. layer of fibre glass insulation

3—LARRY SCHERER gas welds piping while Mike Scherer reads the blueprint. One of several father-and-son teams in the Advance plant

4—MAKING a corner weld on a corner plate of 5,720-gallon gasoline trailer

Manufacture

houses most of the manufacturing and assembly operations. The other two main buildings are: the 120 by 100 ft tank welding shop and the 120 by 100 ft paint shop.

Six gas-fired automatic heaters on each side of the big room in the front building maintain comfortable working conditions in the winter with a minimum temperature of 65 F. The heaters are suspended at about 10-ft elevation, and fans distribute the heat. The fans can also be used for air circulation in hot weather in conjunction with two squirrel cages on the roof that are equipped with strong blowers to draw off hot air. The other buildings are similarly heated, each with six heaters and built-in fans.

Welding and Other Equipment

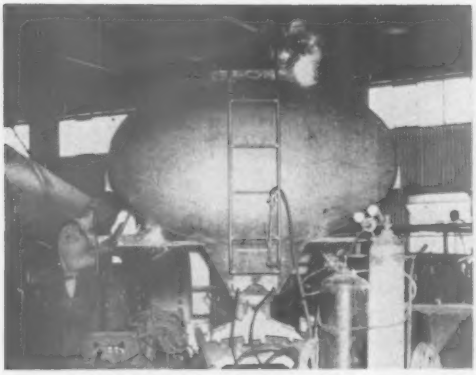
In one corner of the front building, conveniently close to the sheet-metal storage racks, there is a 20-ft press brake that is one of the two largest on the coast. It will form sheet and plate up to $\frac{3}{8}$ in. Many diverse types of dies on a nearby rack enable the forming of a great variety of shapes for truck body parts, sometimes singly and sometimes several parts at a time.

Opposite the big press brake is a 16-ft shear capable of shearing $\frac{1}{4}$-in. steel plate. Other equipment includes a large spot welder, a 6 ft by $\frac{3}{4}$ in. squaring shear, a high-speed nibbler shear, a punch press, a double planishing hammer. The latter forms smooth curvatures in steel to 16 gage, deep drawing on one side and smoothing up with the second high-speed hammer. There are also bending rolls to take sheets up to 5 ft wide by $\frac{1}{8}$ in. thick.

Along the west wall is a pit 90 ft long by 4 ft deep equipped with

5—REPLACING underframe on oil tank truck dismantled for repair

8—KEY MEN in engineering. Left to right, in trio at right, are: Joe Morgagni, president; Pat Tulmello, chief engineer; Earl Hupp, gen. manager



9—FINISHING UP a tank truck. Job requires both arc and gas welding (note torch hanging on the ladder)

10—EXPANDED view of picture 9 shows how the jobs line up in the plant of the Advance Auto Body Works

grinders, vises, drill presses and all other equipment required for piping and other underbody work. Six other pits of the same depth run inwards at an angle from the main pit; each of these individual pits is 4 ft wide by 24 ft long. Trucks being worked upon are placed over these pits for easy access to the underbody. In Fig. 1, a view of the main service pit, the top pipe of the guard rail carries compressed air at 100 psi. The suspended heating and ventilating units can be seen at upper left.

For arc welding, there are 22 welders of 200-amp rating and five 400-amp welders. Inert-arc welding of aluminum sheets is done with a 200-amp welder. For gas welding and flame-cutting, 25 oxyacetylene cutting and welding torches are provided.

The variety of vehicle bodies turned out in this shop is amazing: airport equipment, armored trucks, beverage racks, brewery bodies, butane carriers, camera cars, crash trucks, express bodies, fire equipment, furniture bodies, gasoline tankers, horse vans, insulated bodies, meat packers, oil field flats, panel bodies, propane tanks, refrigerators, special trailers, steel bodies, sound trucks, studio specials, tractor mounts, utility trucks, vacuum tanks, warehouse vans and others. Every one of these calls for many types of weldments.

Turning out Tank Truck

As an example of the type of products turned out, look at Fig. 6, an all-welded, single-compartment tank 20 ft long built to transport 3,000 gallons of hot oil. After plates had been sheared to size, the four inner shell sections were roll formed and welded into a single large tank. Baffles were welded in and heads were welded on, after which a hydrostatic test was given to ASME specifications before mounting the tank on a trailer frame.

Insulation back-up ribs, notched and hand formed, were attached to the tank by intermittent arc welding. The purpose of these ribs (Fig. 7) is to hold a 2-in. layer of fibre glass. When this insulation was in place, a 14-piece outer wrapper of 24-gage steel was attached by welding and bolting.

The company renders a complete designing and engineering service before fabrication. However, it is not just a custom body shop but uses as far as possible the techniques of a production plant. Naturally, organized procedures had to be established. Methods of preplanning and manufacture that would apply both to single and multiple constructions were set up with the dual objective of keeping costs as low as possible and speeding production according to definite schedules.

Here's a good example of the methods followed: an order for 26 complete bodies and cabs for water bottle trucks. In this case it wasn't necessary to start from scratch and work up a complete new design, as the company is fully prepared to do. Instead, a truck built elsewhere could be used as a model. Its construction was fully analyzed. Items of design and methods of construction that were found to be fully desirable were duplicated, but wherever improvements could be effected they were made part of the new plans. One change was to replace steel with aluminum-alloy sheet joined by inert-arc welding. A mock-up of the steel cab was used as a model in working out the fabricating and assembly methods, jig construction and so on.

Job Starts in Engineering

Let's visit the engineering department. In Fig. 8 we see president Joe M. Morgagni (left of group of three men at right), Pat Tulmello (center of trio), chief engineer, and Earl R. Hupp (right), executive vice-president and general manager. These are the men responsible for the thoroughness of preplanning for scheduling, production and materials supply. As soon as an order is received, the engineering department makes design plans (unless these are received from the customer), gets them approved and supplies Plant Superintendent R. E. Tedford with manufacturing drawings. "Ted" analyzes the plans to gain full familiarity with the project and know the manufacturing problems that will be entailed. He then passes the drawings to the layout man assigned to the job. The latter employee works out the full bills of material required, notes what must be purchased and what can be taken from stock on hand and lays out the work for the men in the shop, He also has to make up full-sized templates of thin sheet metal to guide the shearing, brake forming, hand forming, drilling and other prefabrication operations.

All the parts listed on the order are prefabricated and then made up into subassemblies, preferably by welding though occasionally some riveting and bolting has to be used. All parts and subassemblies of a body are fully interchangeable with parts for other bodies in the same order, as they naturally would be because of the use made of master patterns and master jigs and hewing to precision measurements.

After subassemblies and other parts have been welded into the cab and body assemblies, these two major units are attached to the chassis. Then all rough surfaces are ground to precision smoothness, and the job is moved to the paint department. Spray painting is done in one of two 60-ft-long spray booths equipped with powerful exhaust fans and brilliant shadowless lighting. After spray painting, lettering and decoration are put on. The trucks are then road tested and delivered to the customer.

What the Weldors Do

Now let's look at some of the welding work. The three weldors in Fig. 2 are working on a 5,720-gallon frameless tank trailer for hauling gasoline. A jib crane and a two-ton hoist place and position the tank in a corner of the tank welding shop. The weldors are using 3/16-in. electrodes to attach the undercarriage (at top of picture) to the 12-gage high-tensile steel shell. The shell has been welded inside and out.

In the tank shop, the steel plate used to fabricate large and small tanks, is handled and placed for forming and welding by either one-ton or two-ton electric hoists on high-level jib cranes. The jib cranes are located to provide four work stations with commodious working areas. Steel storage racks for pipe and structural shapes are in one corner of the shop. In a covered area of 10 by 120 ft between the front building and tank shop, there are storage racks for bar stock, combination shear, punch and coper and a high-speed cut-off saw.

The type of variable fabrication at Advance naturally requires a greater flexibility than is ordinarily found in most production plants. One of the best aids to flexible operation is the commodious area allotted at each work station to provide convenient access to interiors and "elbow room" for the workers and their portable equipment.

Passing on to Fig. 3, we meet one of several father-and-son teams in the Advance plant. Father Mike Scherer reads the blueprint of a gasoline tank-truck, while son Larry welds piping with a oxyacetylene torch.

The weldor in Fig. 4 is making a corner weld on the corner plate of a 5,720-gallon gasoline trailer tank; this job calls for 5/32-in. E-7010 electrodes and a 200-amp arc welder. The man in Fig. 5 is replacing the underframe on an oil tank trailer that was dismantled for a repair welding job.

In Fig. 9, the two weldors are making the final welds on another tank truck. Fig. 10 shows how this job lines up with other work in the Advance plant.

It will be noted that much of the company's business lies in tanks for the transportation of petroleum products. New tank-cargo carriers offer no safety problem, but it is an entirely different matter with those that are brought in for repair after undergoing service. Gasoline vapor could cause disastrous fires and explosions unless proper safety precautions were taken.

As a safety measure, tank trucks brought in for repair are de-gassed by using compressed air from one of the 100-psi pressure main lines. These lines are supplied from the tank of a compressor powered by a 75-hp motor.

Although the company is best known for its truck bodies, it also designs and builds a variety of storage items to fill specific needs; incidentally, it has one of the finest high-pressure pipe crews in Southern California.

15-TON ALUMINUM CRANE

(continued from page 27)

All parts of the trolley chassis were sawed to size before assembly, and distortion was controlled by conventional methods using stiffbacks and spreaders. The hole shown in the picture is for the compensating sheave pin, and the shear reinforcement plate was welded into position before assembly. The stud is a guide to prevent cable whip.

The complete weight of all the aluminum structural parts used on the crane was 13,400 lb—to be compared with 31,500 lb, the weight of the equivalent parts for a steel crane. The only steel parts in the completed crane assembly are wheels and axles, gear boxes and gears, hoist drum, cables and motors. As the crane span is increased, the weight difference between steel and aluminum cranes becomes even greater.

Weight Advantages

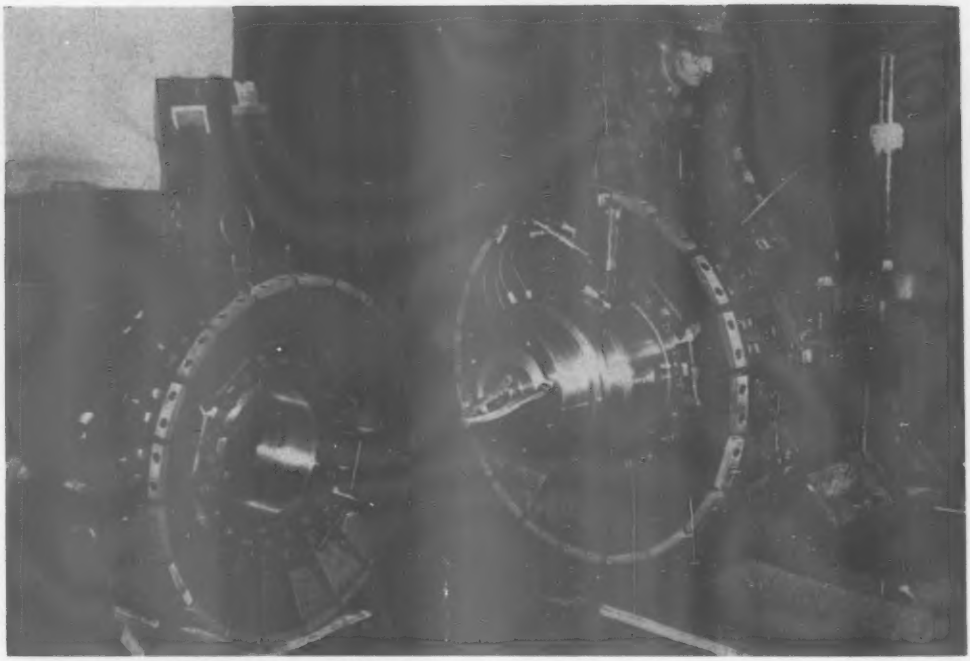
The substantial reduction effected in crane weight makes it possible to increase the lifting capacity without an increase in gross weight merely by replacing a steel crane with a larger-capacity aluminum crane without change in the supporting structure. The weight reduction of the aluminum crane is also a structural advantage, particularly when the crane runway is long. Moreover, faster acceleration and deceleration can be obtained so that the light crane can be spotted and handled more quickly and consequently with reduced power consumption.

The power of the bridge travel motor is proportional to the gross weight carried. In the present aluminum crane, the service is intermittent and the bridge speed moderate; the reduction in bridge motor power compared with a standard crane was 5 hp. The saving in bridge power would be substantially greater, however, for a crane of similar capacity required for high-speed continuous duty and thus subject to frequent starting and stopping, high acceleration and reversing, plugging and braking.

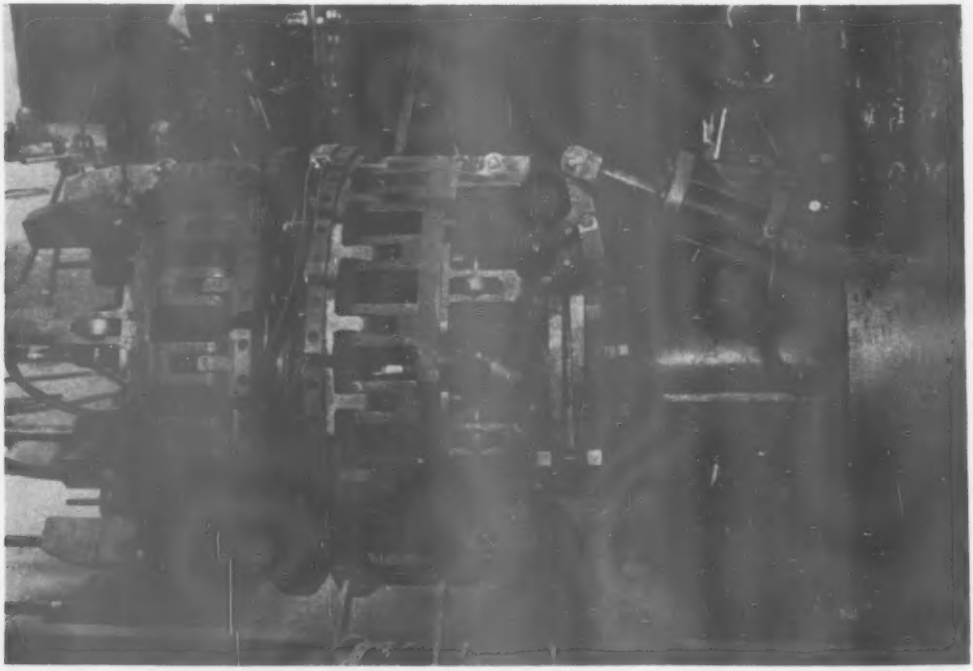
Once the proper welding procedures were established, the aluminum crane was fabricated without any special difficulty. Provincial Engineering Limited is sold on the value of the inert-arc process for fabricating aluminum structures and is considering the fabrication of aluminum fire towers and other aluminum structures.

General Data

Approximate gross weight: 30,850 lb.
Weight of aluminum: 13,400 lb.
Aluminum alloy: 65 ST.
Filler rod: DOC No. 23.
Weight of rod deposited: 640 lb.
Argon consumption: 25,000 cu ft.
Total weld footage: 1,800 ft.
Inert-arc torch: 700 amp.
Tungsten: 5/16 and 3/8 in.



1—WHEEL OF CLAMPING DOGS is provided for each pipe length. Note the back-up shoe at top of the right wheel



2—END OF CLAMP is bolted to end of a 32-ft cantilever boom. The back-up shoe is centered below the welding head

Internal Clamp for Pipe Welding

Making girth welds in the field is apt to be expensive because of the human element. This clamp helps to cut down electrode waste and speed up welding time.

BY WILLIAM R. HARPER
Mechanical Engineer, Westinghouse Electric Corp., Sunnyvale, Calif.

ONE OF the many big problems confronting the oil-field pipeline contractor is the high cost of manually welding pipe lengths together in the field. This welding is done in the open, in all kinds of weather, and the welds have to pass the pipe-line welding code. Human nature being what it is, the cost per girth weld is greatly increased because of waste of electrodes, chipping out defective welds and rewelding.

It's the purpose of this article to describe a clamp that provides a means of machine welding girth joints to offset the human element. Good welds are obtained consistently, waste of welding rod is reduced and the welding is speeded up.

Clamping Done Inside Pipes

This internal clamp, for use with machine welders, holds 30-in. OD pipe in position while it is being rotated under the welding head for circumferential welding of joints connecting 30-ft lengths. The clamp provides internal clamping of each of two lengths of pipe and rounds out the connecting ends by means of hydraulic pressure. The two lengths are pulled tightly together for welding. An internal back-up shoe, made of copper and water cooled, is provided to prevent blow-throughs. First consideration was given to ruggedness and dependability, as these clamps were designed originally for use on the Arabian desert with predominantly native labor. The final design, as now in use, is shown in the accompanying pictures.

Figure 1 shows the two halves or wheels of the expanding internal clamp. These halves are mounted on the end of a 32-ft cantilever boom, and centered under the welding head (Fig. 2). The clamp is now directly over a narrow-gage track. The hydraulic pressure lines and turbine to provide the back-up shoe cooling water are routed from the control panel to the clamp through the 32-ft boom.

Loading and Unloading

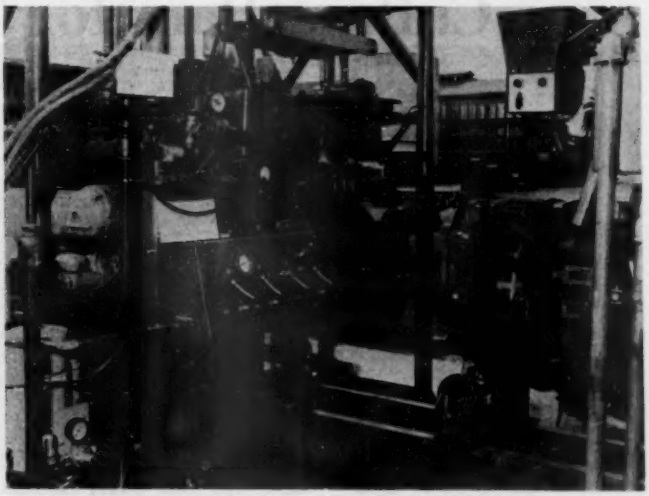
A length of pipe is loaded on a car, which is pulled to the clamp by a cable system powered by an air motor. When the first length of pipe reaches the clamp, the car is lowered a few inches so that the length of pipe may be secured. This particular section of the rail can be raised and lowered by a system of pneumatic cylinders. As soon as the clamp has gripped the length of pipe, the car is raised to the track level and taken back to the loading ramp for the next length. The second pipe is loaded on the car, taken to the clamp and secured for welding. The two lengths of pipe are rotated as a unit during welding. Meanwhile, the car moves back to the loading ramp to fetch another pipe length.

The hydraulic system that controls all operations of the clamp consists of an air-powered reciprocating force pump and an accumulator for dampening the pump impulses. A mixture of water and soluble oil is used as the operating medium. A control panel (left center of Fig. 3) contains the necessary four-way valves for controlling the operation of the clamps, the axial thrust cylinder, and the raising and lowering of the back-up shoe. There are also a hydraulic pressure gage and a shut-off valve for the back-up shoe cooling water.

In operation, the pressure fluid is introduced to the cylinder of the first clamping wheel, that is the one holding the first length of pipe in position. The hydraulic pressure is great enough to round-out slight irregularities in the pipe, as is necessary to obtain a good weld. The second length of pipe is brought into position and pressure is admitted to the cylinder of the second clamping wheel to grip and round out the pipe. The two lengths of pipe are then pulled tightly together by the axial thrust cylinder, which has a total stroke of ¾ in. The back-up shoe is raised to operating position; it bears against the inside of the pipe at the joint and directly under the welding head. Cooling water is circulated through the back-up shoe to prevent it from overheating.

After the welding is completed, several things occur. The back-up shoe is lowered, dogs on both clamp wheels are retracted, and the thrust cylinder

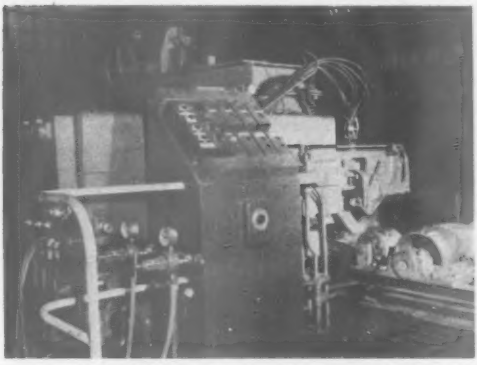
(continued on page 56)



3—CONTROL PANEL contains the four-way valves necessary for control

1—BARS TRAVEL on table to operator's right (as he faces control stand). Rolls feed bars under the cutter

2—HEAVY-DUTY cutting machine moves transversely to bar travel. The 5-in bar is severed in 20 seconds



3—CONTROL PANEL operates the various hydraulic, air and motorized devices for handling the heavy bars

4—POWDER DISPENSER at left helps to make flying starts on cold bars. Powder cutting eliminates preheat

Cutting Bars for Tubing

Production in a tube mill has been speeded up considerably by a mechanized set-up for flame-cutting bars to length. It cuts through 5 inches of steel in 20 seconds.

BAR STOCK used to make seamless tubing must be cut to required lengths prior to the succeeding manufacturing operations. A new oxyacetylene cut-off machine, specially designed for tube and pipe mills, speeds up the rate of output substantially.

The installation illustrated in the above pictures is fully mechanized. The machine will perform the complete cutting cycle when the "start" button is pressed and retract the cutting head from the work at the end of the cycle.

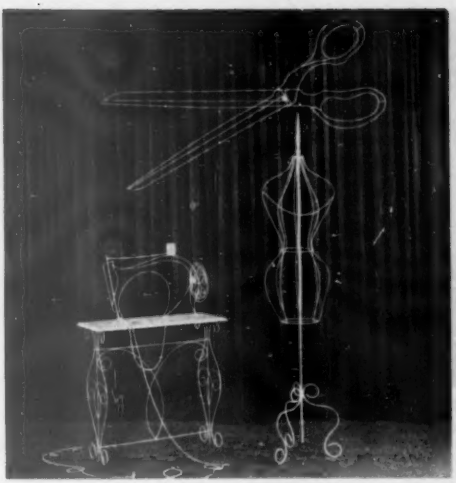
Photos from The Linde Air Products Co.

In Fig. 1, the bars are placed by crane on the slanted table to the operator's right. They pass from the table to the rolls, which feed them to the bar cutting machine in the center of the picture. The roll tables and clamps are not part of the machine proper but were installed by the mill. The bar to be cut in Fig. 1 is 36 ft. 8 in. long and 5 in. in diameter. The chute toward the right of the picture (surrounded by railing) is used to dump slag and short lengths of material.

In Fig. 2, we see the cutting operation. It takes only 20 seconds to sever this 5-in. solid steel round. The bar is plain-carbon steel.

While cutting is going on, the operator manipulates the control panel (Fig. 3), which operates the various hydraulic, air and motorized devices used to handle the bars. The flame-cut bars pass to a run-off table and are taken to the next manufacturing operation.

Flying starts are made on cold bars by using powder at the start of a cut. Powder-cutting eliminates the necessity for preheating. The vibratory powder dispenser appears at the left of Fig. 4.



Designs copyrighted by Adler-Jones Co.

SCISSORS and sewing machines are constructed of wire. So are the caryatids (female forms) in right picture

Welding for Window Dressing

Look at the display pieces on this page! Those clever figures and nifty fixtures are made by bending wires and joining them together. Here's how Adler-Jones does it.

BY W. C. HENZLIK

WALKING down Chicago's busy shopping streets this spring, you couldn't help but notice welded wire angels, church settings and other trappings of Easter. Last winter it was reindeer, snowflakes, Christmas trees and latticework in hundreds of store windows. Most of these wire figures not only decorated the windows but served as display racks or hangers for ties, purses, shoes, hats, dresses and other ready-to-wear clothing or accessories.

Attracted by these figures, sometimes sportily finished in glistening white or in gilt paint, most passersby pause long enough to give a long look at the merchandise. That is about all the best window display can hope to achieve.

These unique figures are the result of five or six years of growth, devel-

Adler-Jones design

REINDEER is a custom-made display to sell expensive silk ties

SNOWFLAKES and cherub make an attractive purse-and-glove display

WIRE STAND for shoes looks lacy but is able to hold heavy weights

1—SELECTING wires and mesh to make a trellis for a garden display. Let's watch this piece take shape

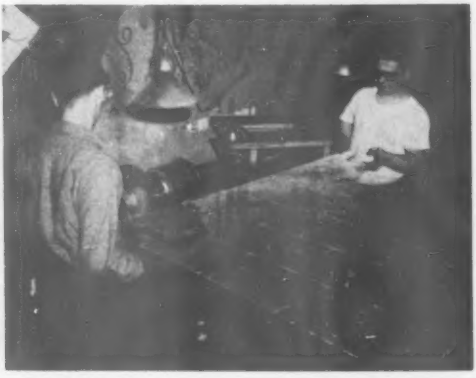
2—BENDING of wire is done manually with a spiral template. Spirals are often found as design elements

4—GAS WELDING ⅛-in. wires to form the outline on the drawing

5—SPOT WELDING an elliptical figure. Note the bent electrodes

6—FINAL TOUCHES are made by Foreman Lundblad with a gas torch

7—SPOT WELDER is used again to secure hardware mesh ½ by ½ in. to the wire outline of panel design



8—ROUGH EDGES of mesh are ground off after cross-wire welding on the bench grinder in the background

3—FOREMAN LUNDBLAD checks the bent wires on the paper layout for the display piece. Note rounds and other forming templates in foreground

Picture sequence shows how a display piece is made

opment and evolution. A wartime shortage of both wood and metal was specially rough on the display industry, pronounced "strictly non-essential" by Washington production controllers. However, the harassed designers were able to obtain small amounts of 1/8 to 3/8 in. diameter wire, which they assembled into heads, stands and other fixtures. Starting in New York City's department store area, within a year or two the idea had spread rapidly to such major shopping centers as Philadelphia, Boston, Miami, Chicago, St. Louis, Dallas and San Francisco.

How a Designer Works

One of Chicago's biggest manufacturers and distributors of welded display fixtures is the Adler-Jones Co., 521 So. Wabash. An oldtimer of 35 years in the display business, Adler-Jones uses welded wire figures and settings to please customers.

Len Roth, chief of design and layout work at Adler-Jones, is responsible for the first ideas for figures to tie in with the merchandiser's three display seasons (Christmas, spring-summer and fall, in that order of volume). His ideas usually follow an industry-wide pattern set at one of the big design conventions. For example, "Venetian-Renaissance" was the theme of a complete line of fixtures used last year. Each item in this line from the smallest figure to productions 10 ft high included some symbol, outline or design to bring to mind the elegance and beauty of 15th century Venice.

The Chinese motif was another to which Mr. Roth had to adapt Adler-Jones ideas. The pagodalike, upturned roof lines of Chinese houses and temples, the lacy patterns of Oriental trees, flowers and bridges were utilized here.

Next Christmas is already being planned. Adler-Jones will use the Victorian theme, says Mr. Roth, to remind people of the "good old days." This will bring in shapes reminiscent of the 1890's—gingerbread porch railings, lion's paw furniture, velvet drapings, etc.

Steel wire, being readily formed and welded, fits into this changing design picture very well. By altering a few templates and welding a few new joints, the same wire can produce Venetian schemes the day after Chinese ones.

All Wires Welded

Welding is the sole joining process for all metal parts fabricated at Adler-Jones. Arc welding was tried and found unsatisfactory from a cost standpoint. Most designs are either gas or resistance welded (cross-wire welding). Everyone of the men in the metal department can use both the welding torch and the spot welder.

Metal Shop Foreman Henry Lundblad, a veteran of 12 years in the business, instructs new employees in the correct welding procedures. As many as 16 men have been working in the metal department during busy seasons.

Welding equipment consists of six lightweight oxyacetylene torches and gas-economizer attachments, an oxygen and acetylene manifold system, one 10-kva spot welder with offset-water-cooled tips and two 7½-kva spot welders with 45-deg-bevel tips. Also in service are: a bench grinder and wire brushes, a belt sander, a mechanical cutter, three hand-operated wire cutters, a metal saw for cutting heavy wire and seamless tubing and a roller for straightening mesh.

Two racks at one end of the welding area hold about 8,000 lb of wire in assorted sizes. Two types of wire are used: a mild-steel wire with a thin copper coating and black annealed wire. Sizes include 8 and 10 gages, 3/16, ¼, and 5/16 in. If additional strength is required, as for instance heavy frames that have to withstand vibration and/or heavy loads, Adler-Jones stocks 3/8 and 7/16 in. seamless tubing. Hardware mesh in stock includes grades having squares of ⅛, ¼, ½ and 1 in. and also a pattern with 2 by 1 in. rectangles. This wide choice of material gives a certain amount of leeway to Designer Roth and allows for alterations as specific orders or material shortages may dictate.

From Paper to Wire

To trace how wire fixtures come from the plant, let's follow one from the time of its birth as a stock number on an order blank.

A department store in Dubuque, Ia., wants a garden arbor design that will help sell this spring's sport frocks and garden-party dresses. They order a standard frame from the Adler-Jones catalog.

At Adler-Jones a full-scale layout on heavy brown paper is on file. This is unfolded and placed on a 6½ by 10 ft table in the welding department. Then the proper types and diameters of wire are selected from the storage rack (Fig. 1). The wires are laid out on the design and cut to size. Then the cut wire is bent with special templates and rounds as shown in Fig. 2.

All bending is by hand since the wire is relatively flexible, but templates are essential to the economical

(Continued on page 42)

STATION at Grace, Mont. Trains don't stop here unless signalled

OXYGEN PLANT and power station. Fish Creek, just behind gas holder tower at rear center, supplies both power and raw material for the oxygen

Mountain Stream—

Above title may make you think you have picked up an outdoor magazine by mistake, but this story has nothing to do with the oxygen fed to fingerling trout.

BY E. S. WHEELER
District Manager,
Shawinigan Products Corp.

ALVIN H. SCHAAL with his inseparable canine pal. Schaal has no employees other than himself

YES, you are reading THE WELDING ENGINEER, not, as the title might suggest, an outdoor magazine. This is a tale of an unusual oxygen business, to the best of the writer's knowledge, the only one of its kind in the United States.

Out in Montana near the copper mining city of Butte, lives a 70-year-old gentleman by the name of Alvin H. Schaal. His business establishment is known as Welders Supply Company. There are hundreds of Welders Supply Companies in the United States, you say. True enough, but only in name is there any similarity to the business to which Mr. Schaal has devoted the past seventeen years of his life.

DOWN IN THE VALLEY

The sentry-booth signal station known as Grace, Mont., is high atop the continental divide east of Butte, on the Milwaukee Railroad. You can also reach the station by mountain road by turning off U. S. Highway No. 10 at the 19 Mile Inn, east of Pipestone Pass, and heading southward and upward for 2½ miles. As soon as you cross the Milwaukee tracks at Grace, the road begins an almost precipitous drop, around and around down the hill into a beautiful valley. Mr. Schaal has built his oxygen and acetylene producing plants in this valley, at the very mouth of a canyon carved out of the rocks by a rushing mountain stream known as Fish Creek.

Save for the whirr of a water wheel and the three buildings erected for living quarters and the two plants, the section around the site is just as untouched by the hand of man as it ever was.

Talk about decentralization of industry! Talk about rugged pioneering, American Free Enterprise and hard work! THIS IS IT!

The oxygen is manufactured by electrolysis of water, with the rushing water of Fish Creek providing both the electrical power and the raw material. This sounds easy, and is today, but it was far from easy back in 1931 when Mr. Schaal first explored the region for his plant site.

To erect his plant, Mr. Schaal had to transport over a thousand feet of 22-in. steel pipe, a couple of 100-kw generators and a 50-hp motor and also heavy oxygen compressing equipment down the steep slopes of the canyon. He had only a one-ton truck to bring everything. The thousand feet of pipe had to be towed up the rocky slopes of the mountains along the route of Fish Creek to car-

ACETYLENE PLANT was made from native logs. Glass strip at the peak of roof admits all the light needed to operate this water-powered plant

WINDOW above tailrace (center) accommodates one trout fisherman

Brook Trout–Oxygen

ry the water to the wheel. A dam had to be built for an intake to the string of pipe. Mr. Schaal did most of the labor himself.

Stringing a Thousand Feet

Steel pipe of 22-in. ID has considerable weight per length. When welded into a column, its management becomes an engineering problem. This did not stop Mr. Schaal. He selected two stout pines, one at each end of the canyon, and strung a heavy steel cable between them. First, he nailed a ladder of slats on the side of the tree at the lower end of the canyon and climbed high up the tree to attach one end of the cable. Then he walked upstream nearly a quarter of a mile to the site of the dam, where he nailed a similar ladder on the other tree. He fastened the other end of the cable at a lower level in this tree, installed a block-and-tackle and went to work stringing the nearly one-fifth mile of pipe.

His truck again came in handy to tow the pipe into position for welding. Following the contour of the canyon and of Fish Creek, this pipe-laying job did not disturb the natural beauty of the canyon, for not a tree had to be felled to fit it into place. Pipe fitting meant plenty of work, however, and after that came the wrapping and insulated boxing necessary to prevent the pipe from freezing in the 40-below winters of Montana.

The dam, built at the head of the string of pipe, is composed of huge boulders rolled into place, several logs and some cement. Though not a product of the engineering skill displayed at Grand Coulee or Bonneville, it does its job of providing head water in sufficient amounts for electrolysis and power.

Had to Do Jury Duty

In the fall of 1932, when Mr. Schaal was building his plant, he received a summons for jury duty. He asked to be excused.

"On what grounds?" asked the court.

"I am building an oxygen plant up in Fish Creek Canyon, your Honor."

"You are going away by yourself to build a factory out in the mountains, where no people reside?"

"Yes, your Honor."

"Humph! Sounds like a stall to me," the judge commented.

Mr. Schaal did his jury duty. Nevertheless, he had sound practical reasons for picking the isolated location.

"I came out here," he told the writer, "because I can operate more cheaply. I have no rent to pay, no power to buy, no labor troubles to reckon with. Also I can ship out my oxygen as cheaply as I could from the city."

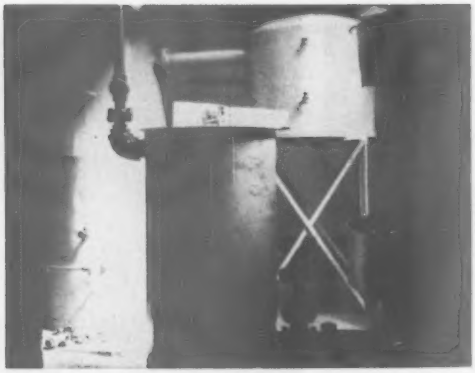
At the time he started the plant, he had customers from three states — Montana, Idaho and North Dakota — and one customer from Canada.

"My investment was not large except in the amount of labor required," Mr. Schaal went on. "While we were working out here we were building up robust health for myself and my family. We enjoyed conquering difficulties. For instance, it took considerable planning to install that pipe line, but when the equipment was placed and we could lay hold of a pipe and send it skimming up the creek channel, the pride we felt well repaid us for our work.

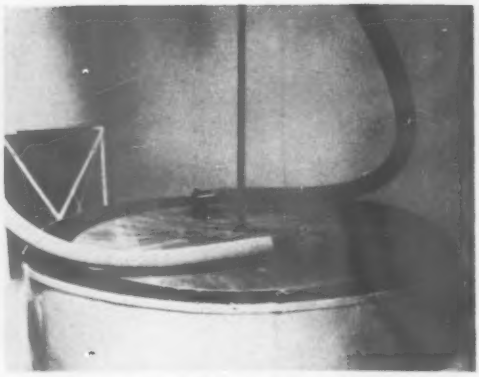
"Most oxygen is manufactured from the air," he continued, "but our way is all right, too. With Fish Creek supplying the power and the water, it just doesn't cost us a cent aside from labor and the cylinder investment. That's a decided advantage."

Cooks with Gas

Fish Creek has other values beside supplying raw material and power, and that's where the trout come in. The writer has enjoyed the privilege of standing in the window above the tailrace of the water wheel and casting into the rushing water to pull in

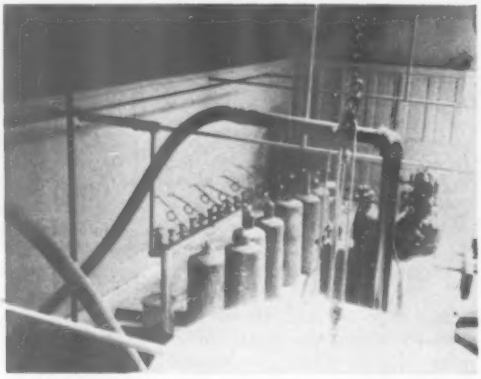


GENERATOR and low-pressure drier in the acetylene plant. Generator was designed for a continuous feed



GAS HOLDER is mostly below ground level. Note the flexible tubes carrying acetylene to and from holder

COMPRESSOR (right) is belt-driven from a pulley on shaft rotated by belt drive from the water wheel



ACETYLENE-CHARGING manifold. Schaal has a loyal customer list for his oxygen and acetylene products

fresh mountain trout—right into the kitchen. Mr. Schaal cooks with gas, too, and again it doesn't cost him a cent, for he captures the hydrogen produced in the electrolysis and uses it as fuel for cooking and heating.

What Price Scenery?

The scenery is beautiful: massive boulders resting one upon the other until heights of more than a hundred feet are attained, pine and fir trees, flowering shrubs and below the plant the flats and meadows where beaver have built many of their dams. Living and working in such surroundings is a further advantage enjoyed by this pioneer decentralizer.

Mr. Schaal is not a newcomer to the welding industry. A native of Gillette, Wis., he came to Butte in 1908 and became associated with the Mountaineer Welders Supply Co. in 1912. This Butte firm also manufactured oxygen by the electrolytic process, but did it in the city and with purchased power. The company sold out in 1926 to one of the major producers of oxygen.

Mr. Schaal, however, resigned his job in 1917 and took a position as city utility engineer of School District No. 1 in Butte. He was and still is a rugged individual, with a brisk walk that belies his 70 years. He loves the out-of-doors and has devoted many hours of his time to hiking over the mountains of the Continental Divide. In the course of these ramblings, he found this location along Fish Creek, so ideally suited to his purpose, and began to lay his plans. Part of his hopes were realized in July, 1933; the other part not until 16 years later.

In August of 1949, Mr. Schaal completed another building on the site and began to produce acetylene gas from calcium carbide. He uses water power to compress it, as he does in the oxygen plant.

The acetylene plant, a new building in 1949, was made from native logs. The comb of the roof is of glass, admitting sufficient light for operation of the plant. Since the plant is entered only during the daylight hours, no electric wiring is necessary.

Inside the log-cabin-like building, an acetylene generator of the continuous-feed type has been installed with a low-pressure drier. Flexible tubes carry the low-pressure acetylene to and from the gas holder. Holder is of the cistern type, set mostly below ground level to prevent freezing in sub-zero weather.

Before going to the compressor, the

for DC Heliwelding

Your best bet is AIRCO THOR-TUNG ELECTRODES

Here's a tungsten electrode that's especially designed for all positions on straight polarity, DC Heliwelding on stainless steel, copper, mild steel and aluminum, using Heliwelding, Airco's inert gas arc welding process. Made with thoriated tungsten, long-noted for its excellent electron emission characteristics, Airco Thor-Tung offers these advantages —

IT DOESN'T MELT . . .

Airco Thor-Tung does not "ball up" at the end of the electrode nor does it sputter off into the puddle when subjected to high arc welding temperatures — because of its cool operating characteristics, longer life is obtained from each electrode.

NO CONTAMINATION . . .

Airco Thor-Tung permits the operator to "touch-start" directly on the work without contaminating the work or the electrode. Uncontaminated electrodes increase production and result in better welds.

EXCELLENT ARC STABILITY . . .

One of the keys to consistent weld quality and ease of operation is good arc stability. With Airco Thor-Tung, the arc is very stable and does not wander or climb up the electrode even at low currents. Touch starting is made easy even with currents as low as 15 Amperes. The better stability of these electrodes enables a given size to be used over a wider range of currents.

ECONOMICAL . . .

Thor-Tung's permanency, ease of operation and stability make it the most economical electrode for straight polarity, DC Heliwelding.

For full information about Airco Thor-Tung, write your nearby Airco office today.

AIRCO

AIR REDUCTION

AIR REDUCTION SALES COMPANY . AIR REDUCTION MAGNOLIA COMPANY
AIR REDUCTION PACIFIC COMPANY
REPRESENTED INTERNATIONALLY BY AIRCO COMPANY INTERNATIONAL
Divisions of Air Reduction Company, Incorporated
Offices in Principal Cities

acetylene must pass through an acetylene purifying box. Water power is used to run the acetylene compressor, which is belt-driven from a friction-clutch pulley on a shaft rotated by direct belt drive from the water wheel.

Mr. Schaal's two plants are not large, as modern oxygen and acetylene plants are rated. He has no employees except himself, and he acts as his own plant operator and also outside salesman. A stock of gases and welding supplies are carried at a downtown location in Butte. Over the years he has built up an extremely loyal customer list—the loyalty would be envied by most manufacturers.

What does this little one-man-operated manufacturing plant amount to? you ask. Almost nothing compared to the huge volumes of oxygen and acetylene being produced each day over these United States of ours, but you're missing the point. Here is a man who, on his own, conquered a bit of nature with his bare hands. He had no financial help from the outside, and he built his plant during the middle of our country's greatest depression.

He had as assets: (1) an idea, (2) a determined will, (3) a great amount of courage, (4) an earnest faith in the nearly extinct, yet wholly American, ideal of free enterprise. He is a tribute to our industry and to our whole nation. Would that there were many more like him!

WELDED WINDOW SETTINGS

(continued from page 37)

production of standard frames. Largely Foreman Lundblad's development, these are designed for use on varying designs. Most can be used for several different diameters of, for instance, spirals or for other curved shapes. They are made of strap iron, ¼ in. thick by ½ in. wide. bent and welded into shape. A right-angled handle on the side of the template (see Fig. 3, right foreground) projects down into the vise jaws to insure steady holding. Some of the rounds are metal and some are wood.

Circular arcs, spiral and other curves and such straight-section members as V's, squares and crosses are joined by the oxyacetylene torch (Fig. 4). Bronze filler rod is used on heavier gages, but on lighter gages, it isn't necessary. The two thin wires fuse well enough when the copper coating melts.

Spot welding of crossed wires (Fig. 5) is an alternate method to gas welding for specified uses. This 7½-kva welder has two copper bars extending through the electrode horns to serve as 45-deg welding tips.

After the outline of a frame has been fabricated, its hardware mesh covering is cut to size. Ordinary wire nippers do the job very well. Both gas and cross-wire welding are done to join the mesh to the outline wire.

Gas welding is used on the points of greatest stress and when it is necessary to add reinforcing bronze metal. Elsewhere, the joining of the individual mesh junctions to the wire is done on the 10-kva welder as shown in Fig. 7. A young trainee does this welding job. Every outside junction of the mesh is joined to the frame. This particular display piece utilizes ½ by ½ in. mesh and 3/16-in. wire. The top electrode in the picture (Fig. 7) is offset for easier operation.

As the mesh is trimmed by nippers, and only to a rough pattern at that, many sharp edges project from the finished panel. After cross-wire welding along the edges, the sharp points of the mesh are ground down on a bench grinder (Fig. 8). Finishing of welds is not required because of the small amounts of filler metal and the smoothness of the deposit.

Final step is to join the frame in an upright position as it will look in the show room. In Fig. 6, Foreman Lundblad puts on the finishing touches. This is one of the bigger models made by Adler-Jones; it stands about 7 ft high, is 2½ ft wide and has an overhanging roof about 2½ ft square. The garden arbor will look very well in the Dubuque store window and will aid its merchandising scheme.

Total time for this panel was under five hours. This includes layout, cutting, shaping, welding and finishing. Working time is figured for every fixture made by Adler-Jones, a company that believes in proper cost accounting.

Foreman Lundblad determines the time for a given fixture by making the prototype model himself. He forms every round, spiral or other curve, welds all connections and finishes rough mesh projections. His total time is a good indication of the time that his men will spend on the fixture once it is in production. It is estimated by W. J. Schryver, Adler-Jones production manager, that the shop uses as much as 45,000 lb of wire and mesh during a year. In busy seasons, the metal shop uses a cylinder of oxygen per day and a cylinder of acetylene every other day. Some 1,400 lb of bronze filler rod are deposited every year.

Custom-Made Fixtures

Special figures and designs are made to order for the customer. The reindeer on page 35 sold ties for a Michigan Avenue shop in Chicago. The scissors at top left on the same page are a stock item; they are constructed of white wire and have adjustable blades. Wire also outlines the dressmaker form and the sewing machine. The caryatid setting (right top illustration) is made of heavy wire throughout with screw-and-bolt hinges and detachable rails. The leaves are rust-colored rayon-velour and the grapes are of white frosted glass.

One elaborate wire Christmas tree involved a tricky lighting problem: to mount a spotlight that would shine up under the branches. It was necessary to provide a special section in the base. Another out-of-the ordinary fixture was a 7-ft chandelier that could be dismantled and shipped in flat sections for the store's display manager to reassemble.

Heavy and elaborate shipping crates are necessary for some Adler-Jones fixtures. Several were so big that the elevator wasn't large enough to hold their crates, so they had to be crated on the loading dock. It is not too unusual for crates to be so heavy that the freight costs the customer more than the original fixture.

Adler-Jones customers are located all over the United States. Some regular patrons order from Canada, Cuba and even South American countries.

New fields for the design and decoration industry have appeared recently. Among them might be mentioned props for television studio settings. Light and artfully designed fixtures can save the producers money and time. Churches, schools and other social groups have also begun to think of display methods and offer a potential market.

If we avoid another war and wartime shortages, the variety and adaptability offered by welded wire display frames should assure their presence in our stores for many years to come.

JIM, HOW ARE WE GOING TO DO ALL THIS CUTTING AND WELDING...AND STILL MAKE DELIVERY ON TIME?
THAT NEW P&H ELECTRODE IS THE ANSWER, BILL. DH-4, THE FASTEST ROD WE'VE EVER BURNED!

NEW P&H DH-4 Electrode

3 Sizes Available

1/8", 5/32" and 3/16"

Operates off DC welder on straight polarity or AC welder with minimum open circuit voltage of 80 volts.

For high-speed welding — cutting and gouging

...perfect X-Ray welds on heavy metal sections without machining or scarfing

This is the most unusual rod ever developed. It has so many applications that the American Welding Society does not have an AWS number for it.

Because of its wide range of usefulness the new DH-4 rod has shown outstanding economies in welding time and costs.

Here are a few of its many advantages: Fast deposition rate. Easy manipulation. Welds mild steel to mild steel without processing. Has extremely high penetration — 1/4-inch with 1/8-inch rod at 300 amps. Cuts time on horizontal fillet welds, flat butt welds, and vertical down welds. Ideal for gouging and cutting. Gives excellent results on Hadfield manganese and high-carbon steels.

If you want to give your production a lift and reduce your costs, you'll want to know more about the unusual DH-4. See your P&H representative or distributor. Write us for details.

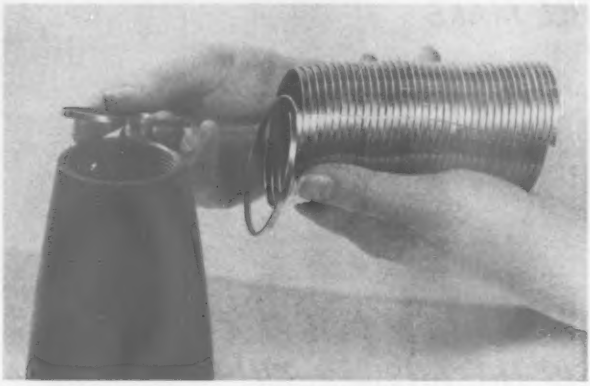
P&H

WELDING DIVISION
4513 W. National Ave.
Milwaukee 14, Wisconsin

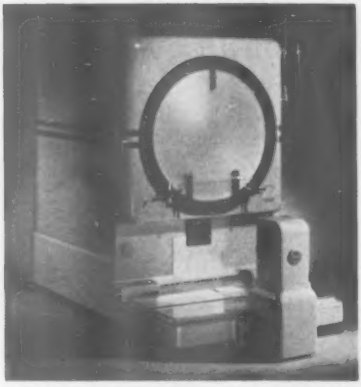
HARNISCHFEGER CORPORATION

Excavators • Overhead Cranes • Hoists • Arc Welders and Electrodes • Soil Stabilizer
Crawler and Truck Cranes • Diesel Engines • Cane Loaders • Pre-assembled Houses 2256

New products



CUSTOM-FLATTENED silver brazing rings fit special grooves and save on silver. Stress relieving prevents movement when heat is on



CONTOUR of production part is checked against projected drawing in new process.

Silver Brazing Rings Come in Flat Wire

FOR SPEED and economy in certain silver-brazing operations, new flat silver-brazing rings are available in "Sil-Fos" and "Easy-Flo" wire. These rings are featured by a notched coil and a stress-relieving process to keep dimensions accurate. They are designed for applications requiring larger volumes of silver alloy and where the depth and shape of grooves prohibits round wire rings.

The new flat wire rings can be made in any diameter and of any thickness in butt, lap and gap form. Since they are flattened to individual job specification, they provide a complete fill, states manufacturer. The stress-relieving process keeps each ring within a plus or minus 0.001-in. tolerance and also keeps them from distorting or falling away when heat is applied.

The "no-tangle" notched-coil feature is said to save up to 60% in handling cost over former designs. The notch-coil rings are snapped off the coil individually without breaking.

LUCAS-MILHAUPT ENGINEERING CO., 5051 South Lake Drive, Cudahy, Wis.

* * *

All-State Distributors To Flux-Coat Your Rods

Distributors for ALL-STATE WELDING ALLOYS CO., INC., 273 Ferris Ave., White Plains, N. Y., are now prepared to arrange for the flux-coating of gas welding rods. The rods must be in 18-in. lengths and 3/32, 1/8, 3/16, or 1/4 in. in diameter. Minimum quantity for coating at one time is 1,000 lb, and minimum of any size is 500 lb.

* * *

Silicone Lens Tissue Cleans Welding Goggles

FOR GREATER EASE in keeping safety goggles clear, American Optical has a new dispenser for large-size silicone-treated lens tissues. The size of the tissue is 5 by 6¾ in., some 50% larger than the average tissue. The tissues are packed 800 to a packet.

Silicone-treated tissues are claimed to remove from lenses such foreign matter as dust, dirt, lint and smears.

The dispenser is of 20-gage steel with no moving parts. It comes with four mounting screws and a lock.

AMERICAN OPTICAL CO., Southbridge, Mass.

Visual Projector Speeds Inspection

BY PROJECTING a greatly enlarged shadow or a surface reflection of a production part onto a large screen, a new contour projector permits a quick visual comparison of the actual part against a detailed drawing. The drawing is projected on the viewing screen and the shadow of the part is brought to the same dimensions. Any discrepancy of detail will then stand out like a sore thumb.

This handy inspection tool is called the Kodak contour projector, Model 3. It has a unique optical system that allows a full unvarying eight inches of space between lens and object for all magnifications up to 100X. The space permits use of high-production staging fixtures that automatically key the projected object to a tolerance chart, which may be accurately positioned over the projection screen.

The projector body, the work table and the lamp house can all be separated for attachment to large fixtures used in optical gaging of very large equipment.

EASTMAN KODAK CO., Rochester 4, N. Y.

* * *

Masking Compound Saves Metal from Heat, Spatter

FOR PROTECTING surfaces next to welds, "Eutect-Mask" is claimed to resist flame, spatter and other marring actions. It is spread over the

for welding

Look at these new production ideas: flat silver brazing rings, gantry for submerged-arc welding and low-inertia-head welders! Do you want a brass substitute, a magnesium brazing rod or a disc sander?

welding area right in the flux. The dried residue is said to be easily removed after welding is finished.

The "Eutect-Mask" compound is canned in thin paste form. It can be used on every sort of surface from steel plates to chrome-plated door handles.

EUTECTIC WELDING ALLOYS CORP., 40 Worth St., New York City 13.

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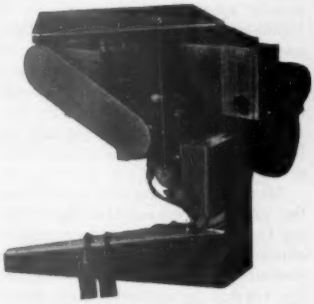

Precision Gears Minimize Backlash on Positioners

PANDJIRIS positioners for production-line welding offer such improvements as protected tilting and rotating mechanisms, precision-cut gears, magnetic cross-line starters and continuously variable power table rotation with choice of manual or power table tilt.

The shield over the rotating mechanism prevents any weld spatter from adhering to it and causing trouble. Safety limit stops on the table halt its tilt at 135 deg. Other features included in this positioner series are Timken bearings, readily accessible pushbutton controls and all-steel welded construction.

There are four models: the 30 MVRMT, 75 MVRMT, 180 MVRMT and the 250 MVRMT. These have capacities of 3,000, 7,500, 18,000 and 25,000 lb, respectively. The 3,000-lb model is available in limited quantity for immediate delivery.

THE PANDJIRIS WELDMENT CO., 5151 Northrup Ave., St. Louis 10, Mo.

• • •

Gasoline-Oxygen Torch Said to Save 25%

A SAVING of 25 to 30% in cutting and scarfing operations is claimed for a new gasoline-oxygen cutting torch developed at Dartmouth's Thayer School of Engineering. The new torch (not yet on the market) will do as much cutting with 70 cents worth of gasoline as an oxyacetylene torch can do with a 100-cu ft acetylene tank, asserts its inventor, James A. Browning, an instructor at the school. The relatively small gasoline tank has to be pressurized when cutting is going on.

Basically, the torch looks like an oxyacetylene torch. In its special tip, however, liquid gasoline and oxygen are blended into a vapor, which is then heated by the torch flame. In earlier models, developed by Browning's father, the vapor was heated by an auxiliary pilot flame.

JAMES A. BROWNING, Thayer School of Engineering, Dartmouth College, Hanover, N. H.

• • •

Vaporizing Liquid Puts Out Gasoline Fires

A ONE-GALLON fire extinguisher named the "Air-Flo" holds a vaporizing liquid that is said to be highly effective against fires in flammable liquids. It is also useful for electrical fires. The extinguisher operates under a different principle from standard types. Inside the container are air pumps to force the liquid out in a continuous steady stream 30 ft long. Sealed in the air-tight compartment, the vaporizing liquid is claimed to last for years with only an annual inspection necessary. Recharging is said to be simple.

BUFFALO FIRE APPLIANCE CORP., Dayton 2, O.

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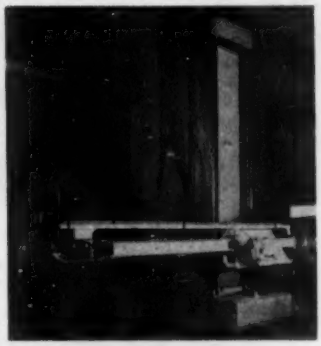
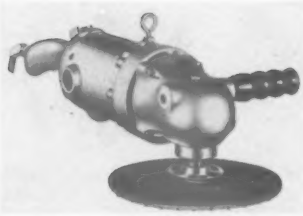


Automatic Welding Gantry Has Speed of 320 Ipm

A NEW MOVABLE gantry for submerged-arc welding equipment can move at speeds varying from 5 to 320 inches per minute. It can also be used to weld seams of 10-ft length at right angles to the gantry track. Flexibility is achieved by installing the welding generator (or transformer) and the flux recovery unit within the gantry column.

The gantry moves on standard-gage railroad track. The welding boom is designed to mount any standard automatic welding head; it is powered for vertical adjustment to vessel diameters of up to 12 ft. The boom is retracted through a variable-speed power source. Dual controls are provided so that all movements may be operated from the end of the welding boom or from the base of the gantry. Variable-speed turning rolls are available to handle 100 ft. vessels.

THE REED ENGINEERING CO., 1003-17 West Fairview Ave., Carthage, Mo.



Portable Disc Sanders Finish Fender Welds

TWO NEW Cummins portable disc sanders are offered for use in auto repairs and body shops, welding shops, metal fabricating plants, foundries, shipyards, etc., as part of the Cummins newly developed "Power Tools for Industry" line.

Model 460 is a standard-duty sander with 7-in. backing pad; it is 18 in. long, not including pad, and weighs 14 lb.

Model 465 (illustrated) is a heavy-duty sander with 9-in. backing pad; it measures 18 in. without pad and weighs 14¾ lb.

The new sanders have a cast aluminum frame, ¾-hp universal motor (a-c or d-c), precision-cut steel gears, sealed precision ball bearings, sanding disc wrench and suspension ring to ease load on operator. No-load speed is 4,200 rpm.

Cummins Portable Tools, Division of CUMMINS-CHICAGO CORP., 4740 N. Ravenswood Ave., Chicago 40.

* * *

Small Ground Clamp for 200-Amp Welding

PRACTICAL design features of larger welding ground clamps have been built into a 200-amp-and-under model. This clamp, the Model 200, is designed for farm, auto repair and light general welding. It has a broad flat base, beveled lower tong leading edge to get under flat work easily and a strong fixed tension spring.

WAGNER MFG. CO., INC., Jackson, Mo.

* * *

Brazing Rod Repairs Magnesium Castings

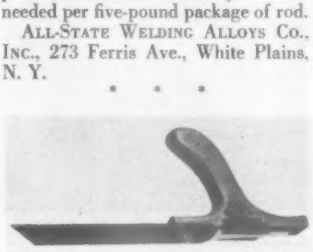
A NEW MAGNESIUM brazing rod fills holes, builds up or repairs cracks in magnesium coatings. It can be applied by either the inert-arc process or with an oxyacetylene torch using flux. It is said to give the same strength and corrosion resistance as the parent metal. However, it melts below the melting point of the casting so as not to damage it during repair. Its low melting point and free-flowing characteristics make it effective for the joining of small parts of thin material.

The application technique is similar to that for aluminum including immediate removal of any flux used to avoid subsequent corrosion. Working temperature of the rod is 1,090 F. It can be used for all types of cast and wrought magnesium except Type Am-403.

Adequate stocks of 3/16-in. diameter by 18-in. lengths are available, but the 5/32-in. diameter is in short supply and can only be obtained with defense orders. If flux is used, one pound of No. 61 "Brazaloy" flux is needed per five-pound package of rod.

ALL-STATE WELDING ALLOYS CO., INC., 273 Ferris Ave., White Plains, N. Y.

* * *



Wood Holder for Files Gives Comfortable Grip

METAL FILES are held easily and firmly by the "Over-Tank" file holder. It is made of wood, which absorbs moisture and does not retain extreme heat or cold.

The holder is positioned above the file so that the cutting surface is unobstructed throughout its entire length, including the tang. This permits easy filing of flat surfaces.

A steel V-block in the handle holds the file to the wood. It is designed so that when the file is driven in it is held very tightly. The tang is covered by the handle for safety.

THE REMONT MFG. CO., Lombard, Ill.

* * *

Silver-Clad Strip Substitutes for Brass

NOW AVAILABLE as a substitute for brass, copper, nickel-silver and other metals restricted by NPA order M-47 is a silver-clad steel strip. This laminated strip product consists of a solid sheet of silver (not an electroplating), clad on either one or both sides of a core of mild steel.

The silver-clad steel strip is available in widths up to 4 in. and in thickness down to 0.005 in., in any required temper. It is being manufactured in various silver-to-steel thickness ratios and rolled and slit to commercial or precision tolerances. The strip is produced with a high as-rolled lustre that requires practically no polishing; it can, if desired, be electroplated directly with gold or other non-restricted metals.

Silver-clad steel can be shaped by stamping, bending, drawing, spinning and other conventional metal-working processes. Component parts can be assembled by means of silver brazing or soft soldering.

Rolled Plate Division, AMERICAN SILVER CO., INC., Flushing, New York.

* * *

Bench Welders Feature Low-Inertia Action

A LINE OF low-inertia bench welding heads features a "tweezer-weld" action to apply the correct amount of follow-through pressure automatically and instantaneously. This type of welder for small parts is said to have been successfully operated at speeds as high as 3,600 welds per hour. Application of the same principle to bench heads is likewise expected to speed production.

All coil springs are eliminated from the pressure system. Also contributing to the low inertia is the complete elimination of all movement in the pressure system at the time the welding current is applied. A set screw provides micrometer-like adjustment of the pressure variable from about 6 oz to about 15 lb between electrodes. The pressure system is cam-actuated.

FEDERAL TOOL ENGINEERING CO., 532 Mulberry St., Newark, N. J.

NEW PRODUCT BRIEFS

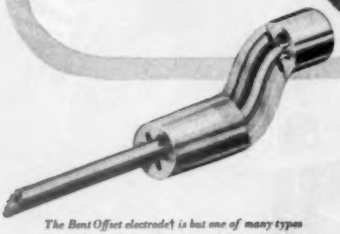
SELF-ADHESIVE "Quik-Label" safety signs are printed on extra-strength cotton cloth and come mounted on handy dispenser cards for quick removal. Each sign is of coated silicone plastic to protect it from dirt and weather. *W. H. Brady Co.*, Dept. 513, Chippewa Falls, Wis.

* * *

DRILLING CAPACITY of ½ in. in metal and 1½ in. in hard wood is claimed for the Model 225 "Super-Special" drill. Its no-load speed is 550 rpm; length is 13⅝ in. and weight 8½ lb. Cummins Portable Tools, Division of *Cummins Chicago Corp.*, 4740 Ravenswood, Chicago 40.

Value Beyond Expectation!

(cross-section of fluted water hole)



The Bent Offset electrode† is but one of many types in which the Mallory fluted water hole is available.

REASONS WHY MALLORY FLUTED ELECTRODES ARE SETTING WELDING RECORDS

- 70% increase in cooling area.
- Positive tube centering.
- Faster heat dissipation.
- Reduced mushrooming.
- Less frequent dressing.
- More rigidity.

Available in all types of electrodes with #1, #2, and #3 Morse tapers.

Mallory Fluted* Welding Electrodes Get the Most Out Of Every Pound Of Copper

In addition to lowering welding production costs, Mallory fluted electrodes are making a big contribution to the conservation of essential copper because of their substantially longer life. And this double feature is gaining new acceptance every day.

Typical reports from the field indicate tremendous performance advantages in favor of Mallory fluted electrodes . . . "3864 welds and still in operation, compared to 1200 welds with other electrodes" . . . "167% increase in number of welds" . . . "10 times more welds on NAX type steel bars" . . . "18,000 welds, compared to 7200 obtained with electrodes formerly used, and no dressing required."

Mallory fluted electrodes will give *you* more welds per dollar, more welds per pound of copper, and require less down time for dressing.

That's value beyond expectation!

Mallory resistance welding know-how is at your disposal. What Mallory has done for others can be done for you.

In Canada, made and sold by Johnson Mathey & Mallory, Ltd., 110 Industry St., Toronto 15, Ontario

Resistance Welding Electrodes, Holders, Dies, Rod and Bars, Castings, Forgings

SERVING INDUSTRY WITH

Electromechanical Products
Resistors *Switches*
TV Tuners *Vibrators*

Electrochemical Products
Capacitors *Rectifiers*
Mercury Dry Batteries

Metallurgical Products
Contacts *Special Metals*
Welding Materials

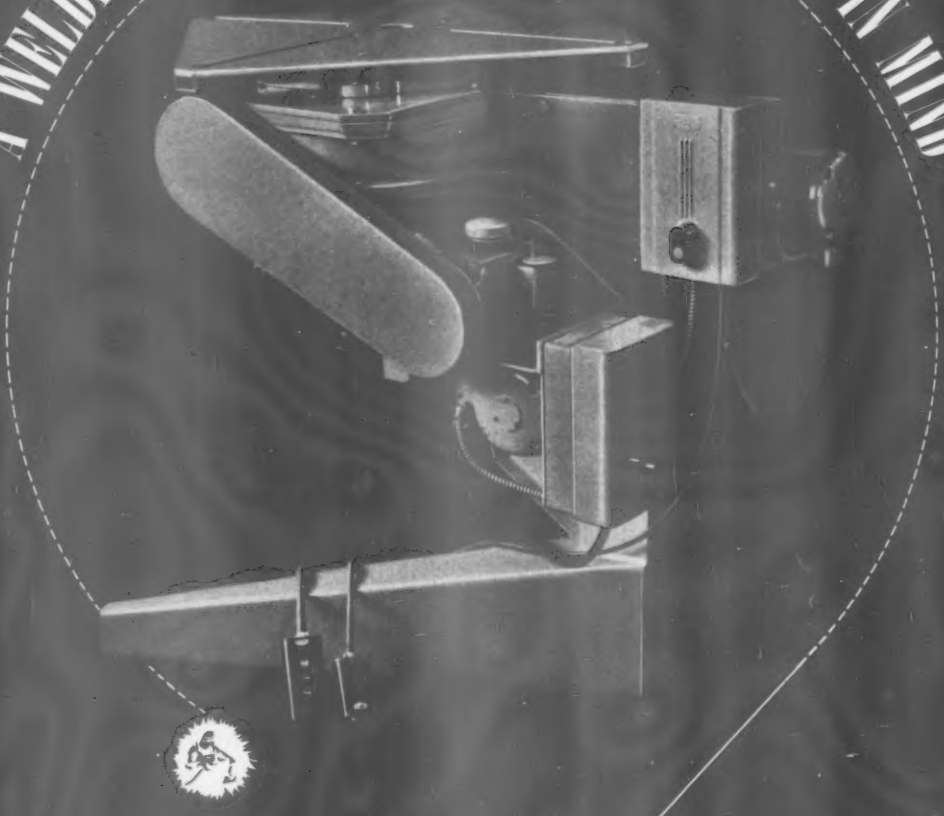
*Patent Pending †Patent No. 2,489,993

P. R. MALLORY & CO. Inc.

MALLORY

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

A WELDING *Positioner* WITH PRODUCTION IN MIND



The Pandjiris Weldment Co.

5151 NORTHRUP AVENUE SAINT LOUIS 10, MISSOURI

WELDING GANTRIES — WALL TRACK PLANOGRAPH WELD ARMS — TURNING ROLLS — TANK JIGS
TUBE BENDERS — HYDRAULIC COIL MANDRELS — SPECIAL POWER WELD TOOLS

Corrosion-Resistant Steel Castings

Wrought Chromium-Nickel Austenitic Steels

(Not Capable of Heat Treatment)

SAE Number	AISI Type	C	Mn Max.	Si Max.	P Max.	S Max.	Cr Range	Ni Range	Other Elements
30301	301	0.08–0.15	2.00	1.00	0.04	0.03	16.00–18.00	6.00– 8.00	....
30302	302	0.08–0.15	2.00	1.00	0.04	0.03	17.00–19.00	7.00–10.00	....
30303F	303	0.15 Max.	2.00	1.00	....	....	17.00–19.00	8.00–10.00	P, S, Se Min 0.07 Zr, Mo Max. 0.60
30304	304	0.08 Max.	2.00	1.00	0.04	0.03	18.00–20.00	8.00–11.00	....
30305	305	0.12 Max.	2.00	1.00	0.04	0.03	17.00–19.00	10.00–13.00	....
30309	309	0.20 Max.	2.00	1.00	0.04	0.03	22.00–24.00	12.00–15.00	....
30310	310	0.25 Max.	2.00	1.50	0.04	0.03	24.00–26.00	19.00–22.00	....
30316	316	0.08 Max.	2.00	1.00	0.04	0.03	16.00–18.00	10.00–14.00	Mo 2.00–3.00
30317	317	0.08 Max.	2.00	1.00	0.04	0.03	18.00–20.00	11.00–15.00	Mo 3.00–4.00
30321	321	0.08 Max.	2.50	1.50	0.04	0.03	17.00–19.00	8.00–12.00	Min. Ti 5xC
30325	325	0.25 Max.	0.60–0.90	1.00–2.00	....	....	7.00–10.00	19.00–23.00	Cu 1.00–1.50
30347	347	0.08 Max.	2.50	1.50	0.04	0.03	17.00–19.00	9.00–13.00	Min. Cb 10xC

Wrought Stainless Chromium Irons and Steels

SAE Number	AISI Type	C	Mn Max.	Si Max.	P Max.	S Max.	Cr Range	Ni Range	Other Elements
51410	410	0.15 Max.	1.00	1.00	0.04	0.03	11.50–13.50	.....	....
51414	414	0.08–0.15	1.00	1.00	0.04	0.03	11.50–13.50	1.25–2.50	....
51416F	416	0.15 Max.	1.25	1.00	....	....	12.00–14.00	.....	P, S, Se Min. 0.07 Zr, Mo Max. 0.60
51420	420	0.30–0.40	1.00	1.00	0.04	0.03	12.00–14.00	.....	....
51420F	..	0.30–0.40	1.25	1.00	..	..	12.00–14.00	.....	P, S, Se Min. 0.07 Zr, Mo Max. 0.60
51430	430	0.12 Max.	1.00	1.00	0.04	0.03	14.00–18.00	.....	....
51430F	..	0.12 Max.	1.25	1.00	....	..	14.00–18.00	.....	P, S, Se Min 0.07 Zr, Mo Max. 0.60
51431	431	0.20 Max.	1.00	1.00	0.04	0.03	15.00–17.00	1.25–2.50	....
51440A	440A	0.60–0.75	1.00	1.00	0.04	0.03	16.00–18.00	.....	Max. Mo 0.75
51440B	440B	0.75–0.95	1.00	1.00	0.04	0.03	16.00–18.00	.....	Max. Mo 0.75
51440C	440C	0.95–1.20	1.00	1.00	0.04	0.03	16.00–18.00	.....	Max. Mo 0.75
51440F	...	0.95–1.20	1.25	1.00	....	....	16.00–18.00	.....	P, S, Se Min 0.07 Zr, Mo Max. 0.75
51442	442	0.20 Max.	1.00	1.00	0.04	0.035	18.00–23.00	.....	....
51446	446	0.25 Max.	1.00	1.00	0.04	0.03	23.00–27.00	1.00 Max.	....
51501	501	Over 0.10	1.00	1.00	0.04	0.03	4.00–6.00	.....	....

F—Suffix F is used to denote a free machining steel.
A, B and C—Suffixes A, B and C are used to denote three types of steel differing only in the carbon content.

Corrosion-Resistant Alloy Steel Castings*

SAE Number	ASTM A-296	ACI	C Max.	Mn Max.	Si Max.	P Max.	S Max.	Cr	Ni	Mo	Other Elements
60303	Gr. 6	CF-16F	0.16	1.50	2.00	0.17	0.04	18.0–21.0	9.0–12.0	1.5 Max.	Se 0.20–0.35
60303A	Gr. 6	CF-16F	0.16	1.50	2.00	0.04	0.20–0.40	18.0–21.0	9.0–12.0	0.40–0.80	.....
60304	Gr. 1	CF-8	0.08	1.50	2.00	0.04	0.04	18.0–21.0	8.0–11.0	.....	.....
60309	Gr. 7	CH-20	0.20	1.50	2.00	0.04	0.04	22.0–26.0	12.0–15.0	.....	.....
60310	Gr. 8	CK-20	0.20	1.50	2.00	0.04	0.04	23.0–27.0	19.0–22.0	.....	.....
60312	Gr. 9	CE-30	0.30	1.50	2.00	0.04	0.04	26.0–30.0	8.0–11.0	.....	.....
60316	Gr. 4	CF-8M	0.08	1.50	1.50	0.04	0.04	18.0–21.0	9.0–12.0	2.0– 3.0	.....
60347	Gr. 5	CF-8C	0.08	1.50	2.00	0.04	0.04	18.0–21.0	9.0–12.0	.....	(See Note 1)
60410	Gr. 10	CA-15	0.15	1.00	1.50	0.04	0.04	11.5–14.0	1 Max.	0.50 Max.	.....
60420	.....	CA-40	0.20–0.40	1.00	1.50	0.04	0.04	11.5–14.0	1 Max	0.50 Max.	.....
60442	Gr. 11	CB-30	0.30	1.00	1.00	0.04	0.04	18.0–22.0	2 Max.	.....	.....
60446	Gr. 12	CC 50	0.50	1.00	1.00	0.04	0.04	26.0–30.0	4 Max.	.....	.....
60502	.....	.....	0.25	1.00	0.60	0.05	0.05	4.0–6.5	.....	0.40–0.60	.....

Note 1 — Cb (min.) = 8 × C; Cb (max.) 1.0.

Heat-Resistant Alloy Steel Castings*

SAE Number	ASTM A-297	ACI	C	Mn Max.	Si Max.	P Max.	S Max.	Cr	Ni	Mo	Other Elements
70308	Gr. 1	HF	0.20–0.40	2.00	2.00	0.04	0.04	18.0–23.0	8.0–12.0	0.5 Max.	.....
70309	Gr. 4	HH	0.20–0.50	2.00	2.00	0.04	0.04	24.0–28.0	11.0–14.0	0.5 Max.	N 0.2 Max.
70310	Gr. 4	HK	0.20–0.60	2.00	3.00	0.04	0.04	24.0–28.0	18.0–22.0	0.5 Max.	.....
70310A	.....	HL	0.20–0.60	2.00	3.00	0.04	0.04	28.0–32.0	18.0–22.0	0.5 Max.	.....
70312	Gr. 5	HE	0.20–0.50	2.00	2.00	0.04	0.04	26.0–30.0	8.0–11.0	0.5 Max.	.....
70327	.....	HD	0.50 Max.	1.50	2.00	0.04	0.04	26.0–30.0	4.0– 8.0	9.5 Max.	.....
70330	Gr. 6	HT	0.35–0.75	2.00	2.50	0.04	0.04	13.0–17.0	33.0–37.0	0.5 Max.	.....
70331	Gr. 7	HU	0.35–0.75	2.00	2.50	0.04	0.04	17.0–21.0	37.0–41.0	0.5 Max.	.....
70334	Gr. 8	HW	0.35–0.75	2.00	2.50	0.04	0.04	10.0–14.0	58.0–62.0	0.5 Max.	.....
70335	Gr. 9	HX	0.35–0.75	2.00	2.50	0.04	0.04	15.0–19.0	64.0–68.0	0.5 Max.	.....
70446	Gr. 10	HC	0.50 Max.	1.00	2.00	0.04	0.04	26.0–30.0	4 Max.	0.5 Max.	.....
70502	.....	.....	0.25 Max.	1.00	0.75–1.50	0.05	0.05	4.5– 6.5	.....	0.40–0.60	.....

*Report of Iron and Steel Division adopted June, 1911. Last revision by Iron and Steel Technical Committee, January, 1950.

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A Welding Engineer Reader Service

1 FLAT BRAZING RINGS—Lucas-Milhaupt Engineering Co., Cudahy, Wis. Literature tells about custom-made flat silver-brazing rings for precision fabrication work. Special notching and heat-treating processes on rings are explained. See page 44.

2 REPAIRING DIPPER TEETH—Stulz-Sickles Co., Newark 5, N. J. 4-page data sheet shows how to use "Manganal" manganese-nickel steel wedge bars and welding electrodes to repair dipper teeth. Sizes, welding procedure and other hints are included.

3 HARD-FACING ROD—The Alloy Rods Co., York, Pa. Single-sheet bulletin tells about the "Wear-Flame 40" hard-facing rod made of chromium carbides contained in a iron chromium manganese alloy matrix. It tells hardnesses available, applications and sizes of rod.

4 OXYACETYLENE FLAME—The Linde Air Products Co., New York 17. 16-page illustrated booklet in laymen's language traces the history of the oxyacetylene flame and tells how industry uses it for welding, cutting and heating. Hard-facing, flame-softening, powder-cutting, scarfing, etc. are briefly described.

5 DRY CHEMICAL SYSTEM—Ansul Chemical Co., Marinette, Wis., 4-page bulletin tells about a new dry chemical piped system for automatic fire protection.

6 HARDNESS TESTER—Newage International, Inc., New York City 17. 4-page bulletin ET 179 relates operating advantages of the Ernst portable, direct-reading metal hardness tester. New design of the tester is described and justified by several illustrations.

7 LOW-INERTIA WELDER—Federal Tool Engineering Co., Newark, N. J. Literature tells about low-inertia head bench welder for joining small parts. Construction is explained as well as operating characteristics. See page 46.

8 WELDING FITTINGS—Edward Valves, Inc., East Chicago, Ind. Table of welding end specifications for Edward cast steel valves gives dimensions, diagrams of straight bevels for pipe wall thicknesses of ⅜ in. and less and diagrams of U-bevels for thicknesses over ⅜ in. An article, "Welding Standardization," by L. H. Carr, director of Edward research accompanies the table.

9 WELDING PURCHASE GUIDE—All State Welding Alloys Co., Inc., White Plains, N. Y. 4-page folder provides purchasing data on All-State welding, brazing, soldering, cutting and tinning alloys and fluxes. The material is collated so that all pertinent data about each product is available.

10 STEEL FABRICATION—Lukenweld Div., Lukens Steel Co., Coatesville, Pa. Single-sheet folder tells about custom fabrication of drying machinery for handling toxic or flaked materials, insecticides, soap and other products.

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11 FILE HOLDER—Remont Mfg. Co., Lombard, Ill. 4-page booklet tells about the "Over-Tang" wooden file holder for comfortable gripping and manipulating of metal finishing files. Sizes, descriptions and construction of the holders are listed. See page 46.

12 HARD-FACING IDLERS—The Stulz-Sickles Co., Newark 5, N. J. 8-page, pocket-size folder gives ideas for salvaging worn tractor idler wheels, drive sprockets and other wearing parts. "Manganal" applicator bars and welding electrodes for these uses are described.

13 CASTING REPAIR—Metallizing Co. of America, Chicago 24. 8-page Bulletin, "Mogul Cast-Seal Impregnating Process," discusses a practicable method of salvaging castings rejected because of porosity, fissures or pinhole cracks. Bulletin explains the process, which makes use of a heated colloidal solution that is circulated through the defective casting.

14 GROUND CLAMP—Wagner Mfg. Co., Inc., Jackson, Mo. Single-sheet bulletin gives descriptions and illustrations of a new 200-amp welding ground clamp for repair and farm use. Other models of ground clamps are shown as are construction details. See page 46.

15 ANTI-SPATTER COMPOUND—Eutectic Welding Alloys Corp., 40 Worth St., New York City 13. Bulletin 312-P tells about "Eutect-Mask," an anti-spatter compound that protects metal from molten metal particles, flames and abrasive particles. See page 44.

16 STANDARD STEEL LIST — The Babcock & Wilcox Co., Beaver Falls, Pa. 4-page technical data card 119C is a revised edition of combined standard steel lists of AISI and SAE covering basic open-hearth, acid-bessemer carbon steels, resulphurized carbon steel, open hearth and electric furnace alloy steels and stainless and heat-resisting steels.

17 WELDING POSITIONER—The Pandjiris Weldment Co., St. Louis 10, Mo. Single-sheet bulletin tells about 3,000 to 25,000 lb capacity models of production line welding positioners. Such construction details as gears, rotating mechanisms and spatter-shielding are discussed. See page 45.

18 CORROSION-RESISTANCE— The Cooper Alloy Foundry Co., Hillside, N. J. 4-page chart aids in the selection of corrosion-resistant steels. In tabular form, it lists more than 200 corrosives and the steels best suited to hold up against them.

19 FIRE EXTINGUISHER—C-O-Two Fire Equipment Co., Newark 1, N. J. 4-page bulletin C-104 tells about 20 and 30 lb. dry chemical fire extinguishers that may be recharged quickly at the scene of a fire. All operating features are diagrammed and explained.

20 WIRE BRUSHES — N. A. Strand Div., The Balmar Corp., Chicago 40. Single-sheet bulletin 40 tells about wire brushes for Strand flexible-shaft machines. Styles pictured and specified include plain circular, elongated, cup shape, carbon cleaning and spring type flexible wire brushes.

21 METALLIZING SALVAGE—Metallizing Engineering Co., Inc., Long Island City 1, N. Y. Bulletin No. 6 tells about salvaging of a cast iron crepeing roll with stainless, of motor blocks with copper and iron and of bearing sections on crushers.

22 DYE-PENETRANT INSPECTION—Dy-Chek Co., Hawthorne, Calif. Single-sheet bulletin 505 passes on a speed-up hint for using Dy-Chek penetrant—wash off the excess penetrant with water. Other tips on technique to identify weld porosity, slag traps, etc. are included.

23 AIRCRAFT STEELS—Joseph T. Ryerson & Son, Inc., Chicago 80. 68-page booklet includes a condensed listing of the new Military (MIL) Aeronautical Specifications, a digest of AN, QQ and AMS specifications pertaining to steel and a wide range of sizes and analyses of steels available from Ryerson stocks.

24 ALUMINUM BRONZE FACING—Ampco Metal, Inc., Milwaukee 46. Company bulletin No. 47 tells about cement mill gears aluminum-bronze-faced for greater wear resistance. Other parts faced with this product are pitman bearings, trolley cross-overs and machine spindle caps.

25 "AIRCOMATIC" WELDING—Air Reduction, New York City 17. Reprint of 18-page article by Harold Robinson and John H. Berryman from *The Welding Journal*. This reprint (Form ADR 69) is illustrated with 45 application and specimen photographs and charts. The text is further supplemented with 11 tables of test and specification data. The article encompasses a general investigation into the weldability of several copper-base alloys with the inert-gas-shielded metal-arc welding process.

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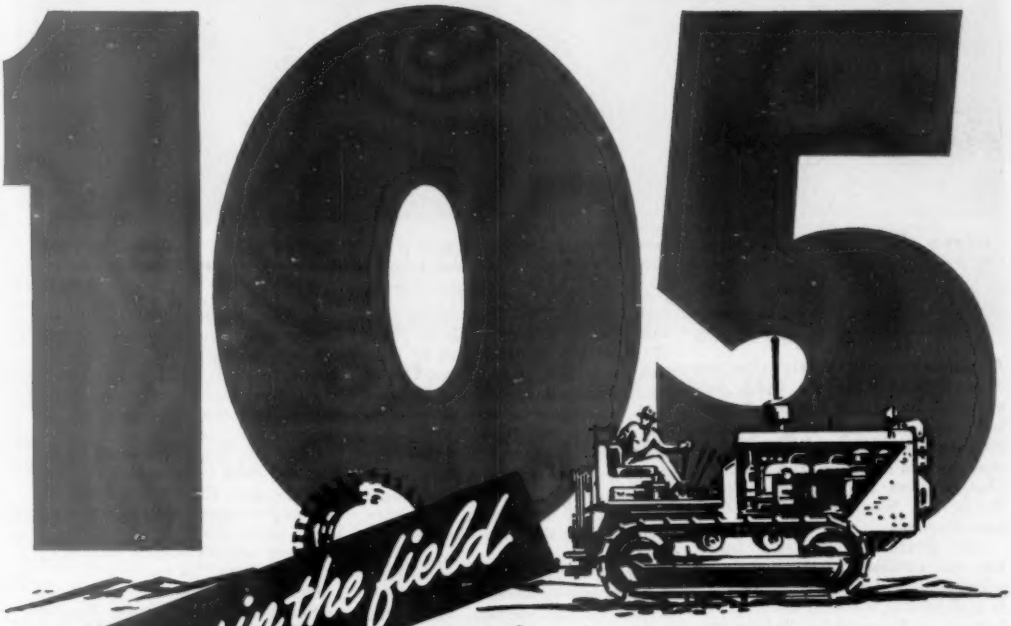

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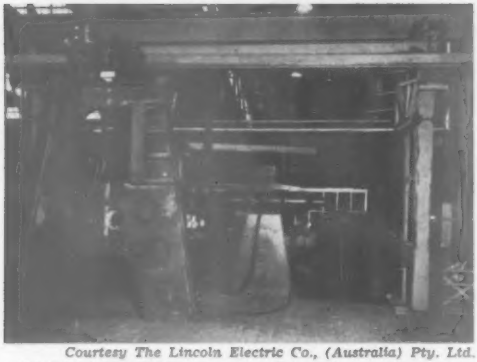

Courtesy The Lincoln Electric Co., (Australia) Pty. Ltd.
HEAVY A-SECTION of marine Diesel being fabricated by submerged-arc welding. Note gantry used for welding

WELDOR'S CASTLE: This unique home was built by Weldor John Gerlicher mostly from old hot water tanks

Australia Welds Heavy Diesels

By Herbert Leopold

COMMONWEALTH MARINE ENGINE WORKS, Melbourne, has under construction six welded Diesels of 2,800 bhp—each five times as powerful as the largest engine that Australian industry could assemble from castings. Designs were supplied by William Doxford & Sons, Sunderland, Durham, England.

The Doxford's fabricated frame has six vertical columns, each of which is an A-shaped section about 12 ft high by 8 ft across at the base. No foundry in Australia has the capacity to cast members of these dimensions. So the A-frame columns were fabricated by welding at the Maribyrnong Ordnance Factory near Melbourne. Each was built up from two flat H-sections comprising a web, side flanges and top and bottom flanges.

Manufacturing operations started with the production of the web, which was flame-cut from two 9/16-in. mild-steel plates previously butt welded together. Then the side flanges were cut from 5/8-in. plate, 4 in. to 8 in. wide, and the top and bottom flanges from 1 3/8-in. and 1 1/4-in. plate, respectively, to the same width as the side members. Before welding, the flanges were dished 2 or 3 deg to offset slight contractional distortion. The top, bottom and side flanges were then welded in their respective positions. When two such H-sections had been fabricated, they were butted together edge to edge and continuously welded along the flange edges to form a rigid box member with overlapping flanges.

One column or A-section required approximately 200 ft of 5/8-in. fillet welds, 50 ft of butt welds in plates 13/16 to 1 1/2 in. thick and 20 ft of butt welds in 9/16-in. plates. Use of the submerged-arc welding process made it possible to weld plate up to 1 1/2 in. in a single pass.

The picture at top left of this page shows how the submerged-arc welds were made. The heavy weldments were located underneath the gantry that carried the traveling welding head.

The use of welding currents as high as 1,050 amp rendered extensive edge preparation unnecessary. Where the joints could be welded from both sides, no plate edge preparation was employed. To join the two H-sections together, it was necessary to bevel the flange edges to give a 60-deg opening with lands 3/8 to 5/8 in.

The Diesel's fabricated frame also included the horizontal members bridging the six vertical columns and a bedplate incorporating crankcase sump and crankshaft bearings.

—McGraw-Hill World News.

• • •

House from Water Tanks

By Parris Emery

BY USING discarded tanks for water heaters, John Gerlicher, a weldor of Duwamish, Wash., has "wallpapered" his five-room home to achieve what he says is bombproof construction. The tanks were cut open and hammered into flat sheets, which were then welded together. The foundation supports were also made of water tanks, welded together and filled with concrete. Altogether, over 800 tanks were consumed.

In this unique shelter, Gerlicher resides with his wife and eight-year-old son, prepared for the day (he hopes fervently will never come) when block-busters or even atomic bombs test the sturdiness of his fortress.

Gerlicher, who is employed by the National Steel Construction Co., emphasizes that he did not build his steel-and-concrete living quarters for bomb protection alone. "I can't go very long without welding something, or I feel rotten," he confessed.

He's glad he doesn't have to build another such home, however, because old hot water tanks have risen in cost from 13c each to three for a dollar.

All doors and windows of this unique residence are made of heavy steel and can be sealed as tight as a vault. Nevertheless, some Houdini succeeded in entering and robbed the bank belonging to John's little boy.

• • •

Slot Cutting Big Pipes

SUBSTITUTION of a cutting torch for a milling machine reduced production time approximately 80% on a pipe-slotting contract and effected a considerable saving in costs. It would have required 500 machine hours of milling to do the job, but only 103 operator-hours of flame-cutting sufficed.

The slotted pipe, 18 in. in diameter, was to be used as well screen in an irrigation well of the city water works of Eagle Pass, Tex. The Alamo Iron Works, of San Antonio, was given the job of producing the slots. Over 3,000 slots, each 8 in. long by 5/16 in. wide, were to be cut in 40-ft

Courtesy Linde Air Products

STARTING a slot cut in pipe of 18-in. diameter with ¾-in. wall

sections of pipe. The pipe wall thickness was ⅜ in.

The contractor ingeniously mounted a two-nozzle coupon cutting adaptor on a portable cutting machine so that both sides of the 5/16-in.-wide slot could be cut in a single pass. Holes were drilled to start the cuts, enabling some 2,700 linear feet of cutting to be accomplished in 103 hours. The cuts were so smooth that they required no finishing.

Oxygen consumption for this job was 1,380 cu ft; acetylene consumption 200 cu ft.

* * *

Pewter Lamp Soldered

HALF A DOZEN shops said the job couldn't be done. Yet today a pewter lamp base is as good as new—the broken piece of the molding flash replaced by soldering.

The lamp was one of a pair treasured by a retired admiral of the U. S. Navy. When it was broken by accident, he took it from shop to shop for repair only to be told, "That's pewter. We can't do anything with it." Finally, however, the problem was solved by technical men of All-State Welding Alloys, Inc.

After the broken edges of the molding were filed clean, the parts were preheated to about 650 F. Then a piece of aluminum soldering rod was dipped into a brazing flux and applied. The rod was for aluminum, and the flux was developed for cast iron, yet in combination they made a good, strong joint in pewter.

The fact that neither of the above soldering materials was originally meant to be used on pewter emphasizes the importance of continual experimentation on the part of those who are given unusual jobs to do. With so many welding, brazing, soldering and tinning alloys on the market, it's not safe to say that anything can't be successfully joined.

Cracked Block *Quickly Repaired*

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Braze welding is the most versatile tool in the maintenance department. Broken parts—large or small—can be repaired by this method with substantial savings in time.

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"Bronze Welding Alloys" describes the many different Bridgeport welding alloys available, gives pointers on their use, and contains other valuable information on braze-welding. Write for your free copy of this 24-page booklet today.

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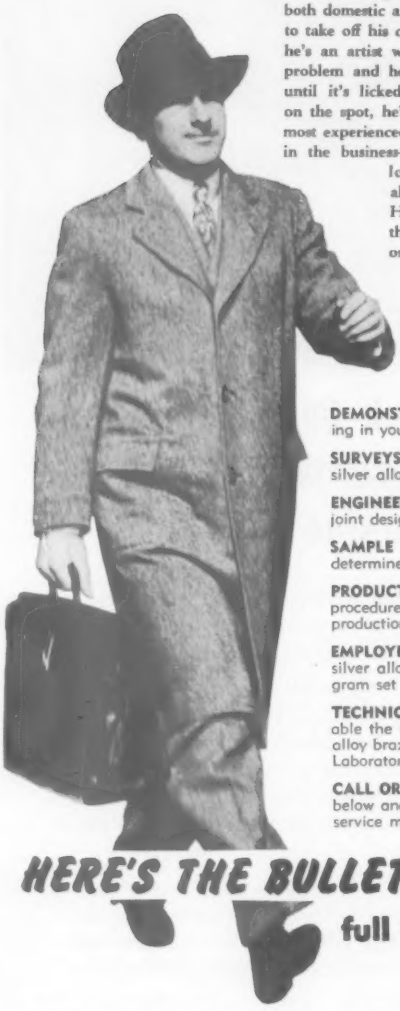
HERE'S THE MAN

to give you expert brazing service

He's the Handy & Harman field service engineer. You'll like him because he really knows his stuff. He was hand-picked and specially trained for the job. He is a friendly chap with a wide background of experience that covers both domestic and war time production. He loves to take off his coat and get his hands dirty—and he's an artist with a torch. Give him a brazing problem and he's a bulldog—he'll never let go until it's licked. And if it's too tough to lick on the spot, he's backed by the top-ranking and most experienced Research and Engineering staffs in the business—originators of the well known low-temperature silver brazing alloys EASY-FLO and SIL-FOS. He's ready and eager to give you the following services—without cost or obligation.



DEMONSTRATIONS—of silver alloy brazing in your own shop.

SURVEYS—to determine if, where and how silver alloy brazing can benefit you.

ENGINEERING AID—to assure correct joint design and most effective application.

SAMPLE BRAZING—of specific parts to determine the best way to braze them.

PRODUCTION AID—to help work out the procedure that will give you the brazing production you want at lowest cost.

EMPLOYEE TRAINING—either in H&H silver alloy brazing schools—or by a program set up in your own plant.

TECHNICAL BULLETINS—making available the technical facts and data on silver alloy brazing as developed in our Research Laboratory.

CALL OR WRITE—the nearest office listed below and say when you would like a field service man to call.

HERE'S THE BULLETIN to give you full facts ...

This new 28-page Bulletin 20 gives the whole remarkable EASY-FLO and SIL-FOS brazing story—including useful information on joint design and fast heating and production methods. It's a "must" for all who design or produce metal assemblies. Write for a copy today.

HANDY & HARMAN — FOUNDED 1867 — QUALITY SERVICE

HANDY & HARMAN

82 FULTON STREET · NEW YORK 38, N. Y.

Bridgeport, Conn. · Chicago, Ill. · Los Angeles, Cal. · Providence, R. I. · Toronto, Canada

Agents in Principal Cities

INTERNAL PIPE CLAMP

(continued from page 33)

is returned to the relaxed position.

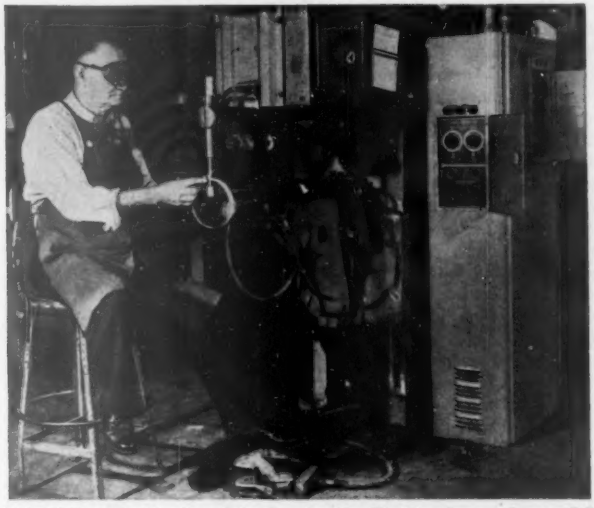
As shown in the pictures, the clamp proper consists principally of a main central tube with a flange for connecting it to the cantilever boom, two wheels of clamp dogs and an hydraulically raised and lowered copper back-up shoe. The two clamp dog wheels rotate on bronze bushings, grease lubricated; each wheel has 20 radial clamp dogs with replaceable serrated faces. The clamp dogs on each wheel are actuated by one common piston and are returned to the relaxed position by nested springs and T-bars. We have already described the axial thrust cylinder and piston arrangement for pulling the two lengths of pipe tightly together. At the end of the welding operation, the thrust cylinder and its attached clamp wheel are moved ¾ of an inch to the left of the first position.

Let's now look at the detail of the copper back-up shoe and its elevating mechanism. One end of the back-up shoe carrier is pivoted to the upper end of an enclosed spring carrier. The spring carrier has a roller at its lower end; this roller rides on an inclined ramp. A small hydraulic cylinder pulls the roller end of the carrier up the ramp, pushing the back-up shoe into contact with the inside of the pipe. The spring serves two purposes: (1) it provides the necessary pressure between the back-up shoe and the pipe, and (2) it allows the shoe to follow the small irregularities of the pipe without dragging too heavily against high spots, such as the longitudinal weld bead inside the pipe. The back-up shoe has an insert of hardened tool steel in its leading edge. The serrated faces of the clamp dogs are also hardened.

Considerable experimentation was required in the design of the back-up shoe since there were no data available on: the depth of groove that would be necessary; the pressure of the shoe against the pipe; the optimum temperature of the back-up shoe; or the length of contact of the shoe leading and following the point of contact of the electrode.

Pressure sealing throughout the clamp is with Neoprene "O" rings; these have given good service under conditions of fairly high pressure and desert temperatures.

Solar Aircraft Welds Close to the Edge



Material does not split out, spattering is reduced on this jet engine part because G-E slope control permits a gradual increase in welding current that also reduces tip pick-up and spatter. More welds can be made before electrodes must be cleaned. Welds are sound and uniform. Bulletin GEC-534.

G-E Slope Control for Resistance Welding Prevents Split-outs on Stainless Steel Jet Engine Parts

More precise work possible with this resistance welding accessory used with G-E synchronous control.

Solar Aircraft, like many other plants working on jet engines, has found G-E synchronous control, with slope control added, will enable operators to work to closer tolerances, produce faster, with fewer rejects. The part shown is welded close to the edge but does not split out, and spatter is reduced on both stainless and mild steel.

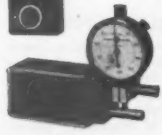
Use G-E Synchronous Control wherever AN-W-30 and 32 specifications must be met. It assures consistently uniform high quality welds—operates quietly, requires little maintenance. Like all G-E electronic equipment, it has long life, is enclosed in a compact unit that may be mounted on the welding machine or wherever convenient. Easily inspected. Write today for Bulletin GEA-4699. *General Electric Company, Schenectady, N. Y.*

Be sure of consistent, high-quality welds with these G-E Accessories

DETERMINE THE BEST TIMING FOR A JOB **Portable, inkless G-E cycle recorder makes a record of the exact timing on test welds, is then used as a check to verify the setting on machines in production. Bulletin GEC-376.**

HOLD WELDING CURRENT CONSTANT **Regardless of line-voltage variations of as much as plus 10 per cent and minus 20 per cent, the G-E electronic voltage-regulating compensator holds welding current constant. Bulletin GEA-4223.**

REDUCE BRITTLENESS **Heat treat medium-carbon, low-alloy, or high-alloy steel with G-E tempering control. Easily installed and operated. Adjustable to suit thickness and type of metal welded. Bulletin GEA-4201.**



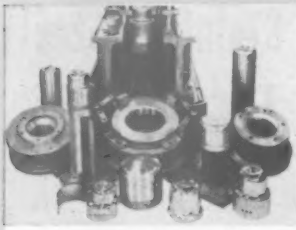
MEASURE ELECTRODE FORCE **Check existing gages on spot, seam, or projection welders or at time of set up. Easy to use, saves time, acts as a production check. Force range: 0 to 4500 pounds. Small, portable. Bulletin GEA-3628B.**

PREVENT CURRENT VARIATIONS **Where the insertion of magnetic material in the throat of the welding machine causes weld variations, the current-regulating compensator keeps current constant to within plus or minus two percent. Bulletin GEA-4207.**

GENERAL ELECTRIC

645-54

300% more life from dies



overlaid with Ampco Bronze Electrodes

Production was increased from 3600 deep-drawn cases (for sealed refrigeration units) to 15,000 cases, when Industrial Stamping and Manufacturing Co. of Detroit overlaid their steel punches and die-rings with Ampco Bronze electrodes.

Big Savings in Press Room

Downtime was greatly reduced and operating time increased. Efficiency was upped 15% because presses did not have to be stopped to hone and polish dies or change tools in the middle of a run. Average production was increased to 15,000 units before appreciable signs of wear on the dies.

Put Ampco Bronze electrodes to work for you. Enjoy longer production runs, less downtime, lower costs.

Industrial Stamping and Mfg. Co. personnel inspecting punch overlaid with Ampco Bronze electrodes.

W-112

AMPCO

Ampco Metal, Inc.
Milwaukee 46, Wis.

It's Production-Wise to Ampco-ize!

SEABOARD DISTRIBUTOR

(Continued from page 20)

participate in the distribution of promotional literature furnished by suppliers of equipment.

A portion of the catalog material has, in the past, been printed by the company. Supplemental cataloging material furnished by suppliers is included in a loose-leaf binder for use by the sales department and distribution to larger industrial customers.

At the present time, the company is completing two new catalogs, one for each division. Each will be accompanied by a separate price schedule, subject to change when warranted.

Equipment and supplies are displayed through the use of display cases, open shelving and floor arrangement throughout the system of plants, district offices and the majority of sub-branches.

The company has consistently tried to recognize the necessity of being merchandise-minded with respect to the lines of equipment and supplies it sells in conjunction with its gases. The sales figures reflect the results of this policy, which has proved to be a good one.

Delivery System

The initial delivery medium was an old rebuilt Cadillac touring car. From this small beginning, the company has built up a fleet of delivery trucks now totaling over 100 units.

Operating over the highways of ten states in the middle Atlantic and eastern seaboard regions, the company's modern fleet of tractor-trailers and straight trucks is probably unequalled anywhere else in the industry. Most of the tractors pulling the huge trailers are now Diesel-powered.

The trailers themselves are of special design and constructed of aluminum throughout. The light weight enables the company to increase materially its payload of cylinder equipment and supplies.

In addition to the tractor-trailers, the company operates a large fleet of heavy-duty trucks equipped with loading lift gates and special compartments for carrying equipment and supplies. These are operated out of the plants and district offices for door-to-door selling in rural territories. An adequate fleet of trucks

SPATTER *Doesn't* MATTER...

ON A HARGRAVE WELDERS' CLAMP

NO. 41 LIGHT SERVICE

NO. 45 DEEP REACH

NO. 43 HEAVY SERVICE

SPRING CLAMP

For spot welding and other light duty welding. Holds firmly, releases instantly. Useful where speed is needed. Every shop needs a few.

INDIVIDUALLY TESTED

Hargrave Nos. 41, 43 and 45 Welder's Clamps resist spatter permanently because the Patented screws are made of an anti-spatter, solid alloy material—not to be confused with ordinary plated types of screws. They speed your work . . . ease the job and give years of trouble-free service. Frames are forged steel, heat-treated and designed to give greatest strength for weight. Oscillating (ball and socket) tip is put on to stay. Each clamp is Individually Tested. Openings in all popular sizes.

WRITE FOR CATALOG

showing the complete line of Hargrave Individually Tested Clamps, Chisels, Punches, Star Drills, Brace Wrenches, File Cleaners, Washer Cutters, etc.

There is an Industrial Distributor Stock near you.

HARGRAVE

1944 Waverly Ave.
Cincinnati 12, Ohio

The Cincinnati Tool Co.

YOU CAN BE **SURE**.. IF IT'S
Westinghouse

NEW D-C WELDER CUTS COSTS...ENDS NOISE ...FREE TRIAL PROVES IT!

★ **SAVES $126 A YEAR IN POWER COSTS ALONE!** New Westinghouse D-C Welder has no-load loss of only 500 watts, compared to 2480-3600 on a conventional motor-generator welder.

★ **SELENIUM RECTIFIER ELIMINATES OLD NOISY MOTOR-GENERATOR!** Lightweight, quiet, saves motor maintenance costs.

★ **SIMPLICITY SLASHES OPERATING COSTS!** Only 3 basic elements—transformer, reactor and rectifier. New D-C Welder occupies less space, has no brushes, armatures or bearings to replace or repair —no moving parts to clean or lubricate.

★ **SMOOTHER WELDING...** Less arc blow... easier arc striking... better weld quality.

FREE TRIAL!

We'll arrange DEMONSTRATION OR TRIAL INSTALLATION... at no cost to you. Contact nearest distributor, or write Westinghouse Electric Corporation, Dept. DC46, P. O. Box 868, Pittsburgh 30, Pa.
J-21593

Westinghouse
D-C Welders

PAGE Stainless Steel
WELDING ELECTRODES
Armor Welding Electrodes
. . . and All Standard Types
AC or DC . . . the BEST
. . . for any weld
on all types
of stainless steel

STAINLESS STEEL has great strength . . . but its strength is limited by the quality of welds which seal the joints. In all kinds of manufacturing—military work in particular—stainless is being used more widely. If you weld stainless, choose electrodes with care.

PAGE STAINLESS STEEL ELECTRODES, AC or DC, give a stable arc under all conditions. The metal flows smoothly. Slag is clean and easily removed. The coating resists cracking down to very short stubs. Now available in 10-lb. lined, hermetically sealed metal cans which can be reclosed. ***Be sure . . . specify Page Stainless Steel Electrodes.***

ACCO
Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Portland, San Francisco, Bridgeport, Conn.
PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE
PAGE WELDING ELECTRODES

for city deliveries is also maintained.

The medical division is equipped with specially designed trucks which furnish 24-hour oxygen therapy and oxygen tent service to the metropolitan areas of the larger cities. These trucks are equipped with two-way telephone service like police cars.

Export Division

You wouldn't think that a welding distributor would be likely to go into the export business, but that is what Southern Oxygen has done. About four years ago, it established an export office in New York City under the management of John J. Morrissey, formerly associated with the export firm of Frazer & Co., Inc. A large display room and offices were acquired at 157 Chambers Street in downtown Manhattan.

Under Mr. Morrissey's direction, the rapidly expanding export division has become a million-dollar business. It operates throughout the world, with leading foreign distributors handling the entire line of products, both industrial and medical.

To sum it all up, Southern Oxygen Co. wouldn't be where it is today if it didn't thoroughly understand the art of selling. Though the distribution of welding equipment and supplies accounts for only a portion of the company's total sales volume, it is an important portion.

Contact Booths Again at NWSA 7th Convention

Bigger and better contact booths are to feature this year's annual convention of the National Welding Supply Association, being held at the Hotel Statler, Cleveland, on May 7, 8 and 9. The contact booths will be in the hotel's grand ballroom and may be visited from 2:30 p.m. to 5:00 p.m. on Monday May 7 and Tuesday May 8. No conflicting business sessions are scheduled for these afternoons.

Booths are to be of a standard uniform size—8 ft wide, 6 ft deep and 8 ft high—and will be furnished uniformly with a table, straight-backed chairs and a two-line sign. Manufacturers may have sales literature available, but no products, parts or models on display. Liquor will not be permitted in the booths, nor any form of entertainment such as the showing of motion pictures.

X-RAY LAB ON WHEELS

brings mountain to Mohammed

If it's impractical or impossible to check your welds with a stationary x-ray unit, investigate the production-proven advantages of the GE Mobile OX-250. By far the most popular industrial radiographic unit to come out of World War II, it meets today's defense requirements with added features to speed up weld inspection.

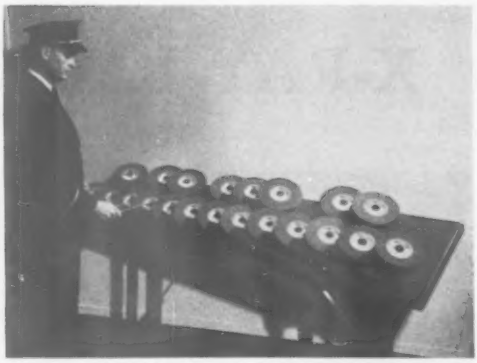
Its compact "head," enclosing *all* high-voltage elements, is highly maneuverable. Its quarter-million volt x-ray output assures ample power for thorough, rapid weld penetration. Wheel it where needed or carry it above congested work areas by its crane ring — it's ready to go to work instantly in any location.

General Electric X-Ray know-how can save you headaches arising from either normal welding inspection problems or from defense contracts specifying x-ray examination. A half-century in x-ray, over 30 years of it industrial, and a complete line of apparatus up to 2,000,000 volts, plus a continent-wide factory service organization — these are your assurances of satisfaction when GE X-Ray tackles your inspection problems.

Avoid regrets — investigate non-destructive x-ray inspection NOW. Address General Electric X-Ray Corporation, Dept. AE-5, Milwaukee 14, Wisconsin.

GENERAL ELECTRIC
X-RAY CORPORATION

EXPANSION joints on Chicago's Michigan Avenue are installed by welding. Old joints are cut out by torch



WHEEL-O-PHONE makes music from 21 grinding wheels tuned to two-octave range. Wheels have rubber bushings

NEWS

RWMA Contest Closes on July 31

ALL welding men interested in the prize paper competition sponsored by the Resistance Welder Manufacturers Association should mail their entries in time to arrive not later than July 31, 1951.

This contest is open to any man in industry, research laboratory work or university research in the United States, its possessions and Canada. Prizes for papers from an industrial or research laboratory source are $750 for first, $500 for second and $250 for third. University source papers are eligible for a $300 first prize and a $200 second prize. Undergraduate students may submit papers for a $250 award.

If you're interested, write to the Resistance Welder Manufacturers Association, 1900 Arch St., Philadelphia 3.

* * *

⅛-in. Aluminum Now Spot Welded

THICKER aluminum sheets have had to be welded since the recent upturn in the manufacture of aircraft. Recently, one manufacturer of resistance welders successfully welded ⅛-in. aluminum on an experimental basis. Three-phase, low-frequency electronic controls were used for this test.

In the last war, the thickest aluminum sheet that could be resistance welded to rigid specifications of strength, consistency and freedom from cracks was 0.070 in. (not quite 5/64).

Air Reduction Builds Kentucky Carbide Plant

A NEW $10,000,000 calcium carbide plant will be built by Air Reduction Co., Inc., at Calvert City, Ky. It will be operated by National Carbide Co., one of Airco's ten operating divisions, under the direction of Russell T. Lund, who is operations manager of Carbide's Louisville, Keokuk, Ia., and Ivanhoe, Va., plants. Construction will begin on July 1.

The new plant will occupy part of a 1,000-acre fronting on the Tennessee River. Its initial rated capacity is announced at 142,500 tons, and it will consume more than 1,000,000 kw-hr a day. That's enough electricity to meet the normal requirements of a city of 250,000 people.

* * *

Like to Play a Tune on Grinding Wheels?

MAYBE you have accidentally struck a grinding wheel just right and heard its clear bell-like tone. Maybe you even know that grinding wheels are graded by tonal electrical apparatus. But did you know that there are musical instruments made from combinations of as many as 21 grinding wheels?

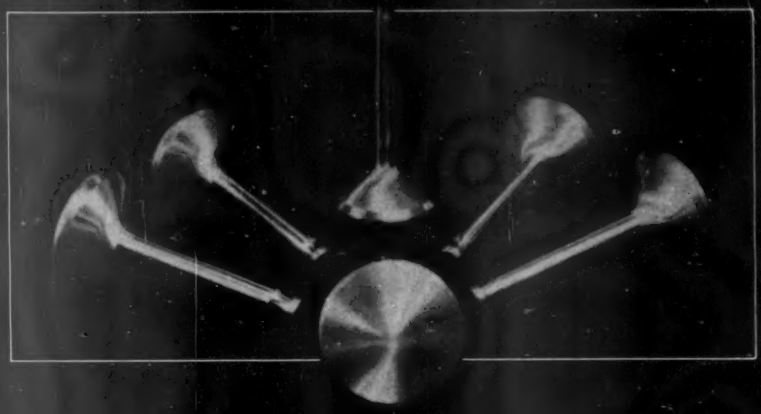
The most famous of such instruments is the Norton Company's "Wheel-O-Phone" (pictured above). Its 8 by ¾ by 1 in. wheels are trued to correct pitch over a two-octave range. They are tuned by altering either the diameter or the thickness. Each wheel has a rubber bushing and is mounted on a slightly inclined spindle.

First appearance of a "Wheel-O-Phone" (a ten-wheeler) was back in January, 1911, at a meeting of Norton salesmen and foremen in Frohsinn Hall in Worcester, Mass. The next recorded use of such an instrument was in 1925 when Norton's Lowell H. Milligan developed a set of wheels to show the application of sound as a grading method. It was in connection with these grading studies and the research attempts to make better grinding wheels that Norton's "B" and "BE" bonds were developed. Since then the use of electrical apparatus for measuring the pitch of the ring of grinding wheels has become a standard grading method.

An industrial radio program in 1937 was an occasion for a later appearance of the musical grinding wheels. Again in 1946, the wheels were played on the "Queen-for-a-Day" program.

First big public performance of the "Wheel-O-Phone" was Nov. 29, 1948, at the Worcester Memorial Auditorium. Dr. Karl T. Benedict, Norton's medical director, handled the mallets, but no record is available of the tunes that were played. At the same performance, two other new musical instruments, the "Wheel-O-Chimes" and the "Cruci-Bells" were played for the first time.

The "Wheel-O-Chimes" consists of 13 "Alundum" wheels of varying sizes used for glass grinding. The "Cruci-Bells" are a collection of 18 pure oxide refractory crucibles used in laboratories. The clapper of each bell is molded from "Norace" cement, while the handles are mounted points with red "Alundum" abrasive for whole tones and black "Crystolon" abrasive for the half tones.



When minimum specs hit tops...

RADIOGRAPHY helps meet them

Newest developments in piston aircraft engines put stern demands on exhaust valves. Specifications have climbed toward perfection. Even a tiny irregularity, chip, fold, or flaw cannot be tolerated.

So the manufacturer radiographs each valve. It is the one way to disclose internal conditions without destroying the part—the one way to release only products of highest quality.

Radiography has become a dependable means of gaining a reputation for constant top-quality work. It forestalls imperfect products—frequently suggests changes in operations that assure higher yields in production runs.

Ask your x-ray dealer to show you how radiography can increase your production and improve quality. Send for a free copy of "Radiography as a Foundry Tool."

EASTMAN KODAK COMPANY
X-ray Division
Rochester 4, N. Y.

Radiography...

another important function of photography

Kodak
TRADE-MARK

Now—YOUR WELDER CAN DO INERT GAS SHIELDED WELDING

WITH THE

Mid-States MISSING LINK

HIGH FREQUENCY ARC STABILIZER

MODEL 13 "MISSING LINK" ARC STABILIZER

- Finger Tip Remote Control at Torch
- Starts Arc Without Contact
- Constant Arc Stabilization
- No Idling Between Welds
- Automatic Gas and Water Control Valves
- Automatic Timed Gas Afterflow
- No Costly Gas Waste
- For AC or DC Welders

Yes, your present welder, AC or DC, can be equipped with the Mid-States "MISSING LINK" Arc Stabilizer for inert gas shielded welding. A compact unit with high frequency generating circuit, gas and water control valves, remote control relay and gas afterflow device—all built into one case. It is equipped with standard gas and water hose fittings, ready for inert gas shielded welding attachments.

The exclusive gas reservoir feature automatically gives selected time afterflow to protect the tungsten electrode after welding arc is broken . . . No electric timer needed . . . no moving parts to adjust or wear out . . . foolproof . . . can also be used for metal arc welding of heavy or thin gauge metals.

There are "Missing Link" Models for 0-300 Amp and 0-600 Amp Welders.

FOR METAL ARC WELDING

"Missing Link" Model 10 is the ideal unit for metal arc welding . . . No pecking or scratching . . . starts arc automatically . . . permits welding of all metals with ease.

REMOTE CONTROL

Small switchette on welding torch is depressed to energize high frequency circuit, start flow of gas and water, and establish welding arc! All stop automatically when arc is broken! Timed gas afterflow, to protect tungsten electrode, is also automatic!

Some territories open for representatives and jobbers. Write today.

SEE YOUR JOBBER OR WRITE DIRECT FOR INFORMATION COVERING THE COMPLETE LINE OF MID-STATES AC ARC WELDERS AND ACCESSORIES

MID-STATES WELDER MFG. CO.
6025 SO. ASHLAND AVE., CHICAGO 36, ILLINOIS

More Tip Drill Sizes for Data Sheet No. 126

INADVERTENTLY omitted from Engineering Data Sheet No. 126, March, 1951, "Welding Tip Numbers Compared to Drill Size of Orifice," were the data from National Welding Equipment Co., San Francisco. This company manufactures three styles of welding torches, types "G," "P" and "R," having orifices that range from drill size No. 12 (0.189 in.) down to No. 79 (0.0146 in.) Data are given below.

	Tip No.	Drill Size
Type G	00	79
	0	76
	1	72
	2	66
	3	55
	4	51
	5	46
	6	41
Type P	0-6	same as Type G
	7	39
	8	36
	9	32
	10	30
Type R	000	75
	00	70
	0	65
	1	60
	2	56
	3	54
	4	47
	5	43
	6	33
	7	30
	8	29
	9	28
	10	27
	11	26
	12	25

* * *

Western Canada Welding Show Attracts 4,000 Visitors

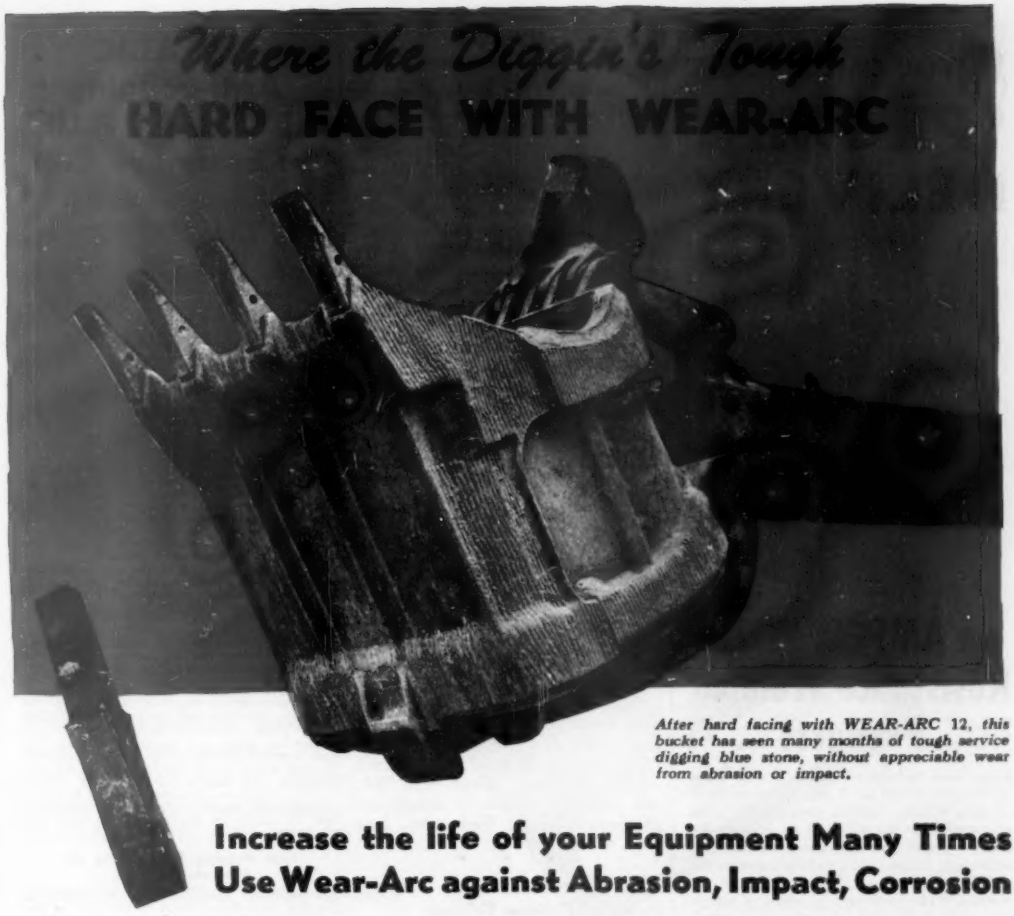
SUCCESS attended the first Western Canada Welding Show at Edmonton, Alberta, Feb. 27-28. It was sponsored by the Alberta Association of Certified Weldors.

Place of the show was the Prince of Wales Armouries. More than 16 leading welding firms took part in exhibits, displays and demonstrations. Attendance was estimated at 4,000 people.

J. W. A. deBoer, president of the Alberta Association of Certified Weldors, welcomed the delegates and guests on the first evening of the show. Other prominent speakers were J. Spankie, chief welding examiner for the province of Alberta and H. Thomasson, Canadian Westinghouse Co., Ltd.

Where the Diggin's Tough

HARD FACE WITH WEAR-ARC



After hard facing with WEAR-ARC 12, this bucket has seen many months of tough service digging blue stone, without appreciable wear from abrasion or impact.

Increase the life of your Equipment Many Times
Use Wear-Arc against Abrasion, Impact, Corrosion

Bucket and shovel tooth life is increased many times by welding wedge bars to worn tooth point with WEAR-ARC WH and hard facing with WEAR-ARC 12 electrodes.

To reclaim worn equipment and hard face against excessive wear, you will find one, or a combination of two, of the seven basic WEAR-ARC hard facing electrodes does the best job . . . increases life as much as four times or more.

WEAR-ARC WH is ideal for build up on manganese steel; WEAR-ARC 12 for providing that hard wearing surface. Ask for bulletin No. 10550, illustrating and describing properties and welding procedures for the complete line of WEAR-ARC hard facing alloys.

"I Like the rod that comes in the RED can"

SEE YOUR NEAREST
ALLOY RODS DISTRIBUTOR

ARCALOY for stainless steel
NICKEL-ARC for cast iron
TOOL-ARC for tool steel
WEAR-ARC for hard facing
BRONZE-ARC for general use

ALLOY RODS CO. York, Penna.

YOU CAN STILL GET

PROMPT DELIVERY

on AMPCO WELD Resistance Welding Products

Keep your resistance-welding line at peak production. Don't let it bog down for lack of tips, wheels, holders, dies. Order what you need from Ampco. You get prompt delivery — and you also enjoy trouble-free operation, longer runs, reduced downtime, and increased output. You can depend on Ampco Weld products . . . made of alloys having high physical properties — meeting or exceeding RWMA specifications.

Behind the famous Ampco Weld line of resistance-welding products is a corps of experienced engineers, ready to help you solve your problems. Just get in touch with us.

AMPCO METAL, INC.
MILWAUKEE 46, WISCONSIN
AMPCO
It's Production-Wise to Ampco-ize!
RW-5

Experts on Titanium to Thrash out Problems

A SYMPOSIUM on the analysis and metallography of titanium will be held June 11-13 at the Sheraton hotel, Chicago. Viewpoints of the manufacturer, user and research scientist will be aired at five panel sessions. Two discussion meetings on chemical methods of analysis and additional sessions on the determination of oxygen in titanium, instrumental methods and metallography are scheduled for the three-day meeting.

Sponsor of the national meeting is Armour Research Foundation of Illinois Institute of Technology. Drs. Julian Glasser and Max Hansen, both Foundation staff members, will be co-chairmen of the meeting.

Moderators named to head panel sessions are: Dr. Steven Urban, director of research, Titanium Alloy Manufacturing Division, National Lead Co., Niagara Falls, N. Y.; E. John Center, supervisor of analytical section, Battelle Memorial Institute, Columbus, O. Dr. Edwin J. Chapin, research metallurgist, Naval Research Laboratory, Washington, D. C., and Bourdon F. Scribner, chief of spectrochemical section, National Bureau of Standards, Washington, D. C.

Walter E. Finlay, research manager, Rem-Cru Titanium, Inc., Bridgeport, Conn., and James R. Long, head of physical metallurgy, United States Bureau of Mines, College Park, Md., will head the session on metallography, scheduled for Wednesday, June 13.

* * *

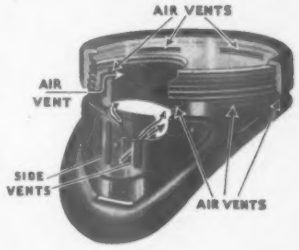
New Paint Test Shows Point of Fatigue Failure

A TESTING PROCESS that includes a "brittle paint" is said to show in advance where a part will fail in fatigue. The process was described by Greer Ellis, consulting engineer of the Magnaflux Corp. at the annual meeting of the American Society of Tool Engineers in New York City.

The paint known as "Stresscoat" is sprayed on the part to be tested, much the same as ordinary paint. When the test part is subjected to the same kind of load it undergoes in service, the metal deforms slightly. The brittle coating then cracks like glass at the points where the strains are heaviest. The coating, said Mr. Ellis, can be made to crack when the metal beneath it is deformed as little as one ten-thousandth of an inch per inch of length.

Such parts as aircraft engine connecting rods, aircraft wings and structural members and other mechanical components have been tested with the new coating.

8 MAGIC Anti-Fogging AIR INTAKE FLUES on Every Eye Cup



The illustration shows the magical ventilating principle of the Sellstrom popular 420 Welding and the 421 Industrial Goggles. The side walls of each eye cup have six 1/8" ventilating ducts with two extra ventilating ducts on each of the outer sides, making a total of eight ventilating ducts for each eye cup or 16 for each pair of goggles.

The air vents or ducts in the eye cups have openings at the bottom of the eye cup 1/4" below the lens with corresponding six openings on the inside of the eye cups immediately below the lens. Between these two openings there are concealed ducts, permitting an abundant flow of fresh air to constantly circulate on the inside of the eye cups. The outside openings are illustrated in the front section of the illustration while the inside openings, directly below the lenses, are illustrated on the rear section of the drawing. The two side vents are illustrated on the front section of the drawing.

Remember there are EIGHT air ducts for each cup; EIGHT "nostrils" for each cup, all of them literally breathing in fresh air and expelling used air.

The Air Ducts are so arranged that it is absolutely impossible for a single speck of light to penetrate the goggles through the air ducts.

Lens Fogging Reduced to an Absolute Minimum

Sellstrom 420 Welding and 421 Industrial Goggles offer the utmost in comfort to the workman but they also increase working efficiency and production because there is an absence of the constant worry about lens fogging.

Order a Few Pair for Test Purposes

Below we illustrate the 420 Welding model Goggle. The 421 Industrial model Goggle is exactly the same except that it has wire screen vents. Order a few pair of each. They are so popular with the trade that most dealers have them in stock. If your dealer does not have them, write us direct.

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MANUFACTURING COMPANY
More Than 200 Eye and Face Safeguards
626-F N. Aberdeen St. Chicago 22, Ill.

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A BRAND NEW CATALOG
FOR BONNEY WELDOLETS

Contains complete and up-to-the-minute catalog information on all types of Weldolet welding fittings available. Presents a full range of sizes and schedules, introducing many new applications, together with simplified data on the determination of code requirements. To get your copy of this catalog, write . . .

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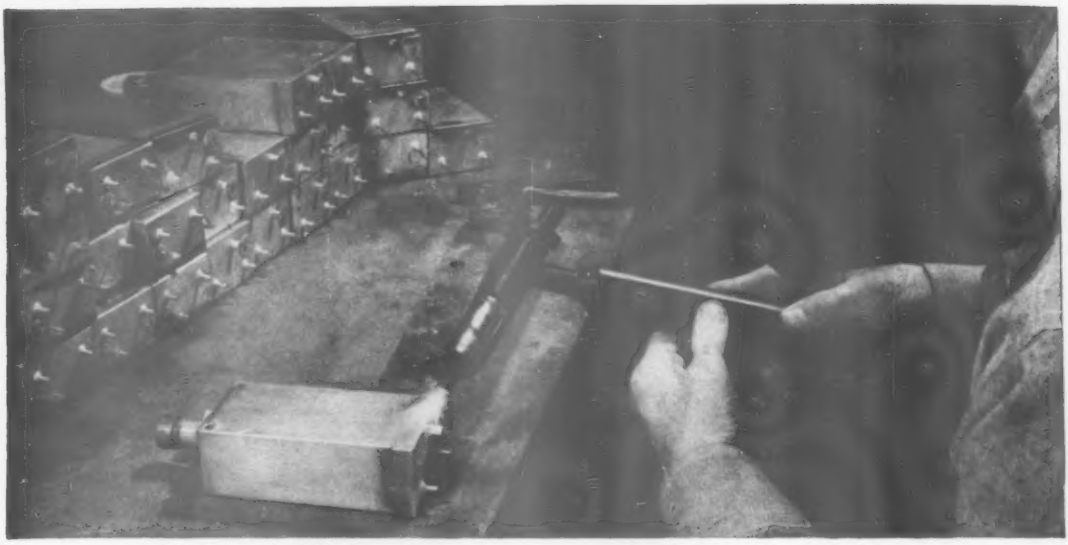


Here, G-E Inert-Arc welding is used to weld the seam on a "buzz box," source of the spark which ignites the fuel in jet engines.

WHY G-E INERT-ARC WELDERS CAN SPEED UP YOUR DEFENSE PRODUCTION

You can speed up the fabrication of ship and plane parts made of aluminum, magnesium, or copper alloys by using General Electric a-c Inert-Arc welders because they are specially designed for welding these materials. They give your operators many features not found in "jury-rig" modifications of ordinary a-c metal-arc welders.

Exclusive "Balanced Wave" Design

Balanced-wave design, for example, an exclusive feature of G-E Inert-Arc welders, enables your operators to increase travel speeds, make stronger welds, and reduce power and gas consumption.

"Idlematic" Control for Safe, Simple Operation

The high-frequency pilot, the flow of gas, welding current, and cooling water are controlled by the use of G-E "Idlematic" control. This permits the operator to save time and reduce spoilage by making it easy to start the arc at the proper spot on the work because he can position the electrode with his hood up.

Crater-filler or Remote Control

On applications requiring weld craters to be level at the end of each weld bead, use of the optional G-E crater-filler will enable you to do the job quickly. Where desired, a hand or foot switch can be furnished to allow continuous stepless current control while welding.

Write for Free Bulletin

For detailed information on how you can speed up fabrication of aluminum and other alloys, write for bulletins GEC-596 and GEC-653. *General Electric Company, Schenectady, N. Y.*

G-E Inert-Arc welders are easy to use. Simply touch the electrode to the work and you're off to a quick clean start—and without using flux. The welders are available in 200-, 400-, and 800-ampere ratings.

G-E "BALANCED WAVE" GIVES STRONGER WELDS, FASTER TRAVEL SPEEDS—with reduced power and gas costs

Key to the advantages of the G-E "balanced-wave" Inert-Arc welder is the use of series capacitors in the output circuit. These capacitors block the d-c current which would otherwise be produced by the arc, and make it possible to get an even, uniform flow of a-c current.

This design, with the high-frequency pilot used only for starting, eliminates objectionable radio interference caused by welders using continuous high frequency.

You Get Stronger Welds, Faster Travel Speeds

Under identical conditions G-E "balanced-wave" welders give you a greater depth of penetration, better bead contours, and greater fusion area than welders with unbalanced-wave circuits.

This means, therefore, that an operator can do the job faster by using the G-E equipment.

G-E Inert-Arc Welders Give Even Flow of Current

Conventional Shielded-arc Welders Give Uneven Flow

Steady current from G-E "balanced-wave" welder gives better welding at lower cost than unbalanced-wave currents from shielded-arc equipment.

"Balanced Wave" of G-E Inert-Arc Welders Produces Deep Penetration, Wide Fusion Area

Unbalanced Wave of Ordinary a-c Metal-arc Welders Produces Shallow Penetration, Narrow Fusion Area

Above macrosections are from two pieces of ¼-inch aluminum, on which beads were run without the addition of filler metal, and under identical welding conditions.

G-E Inert-Arc Welders Can Reduce Your Power and Gas Costs

Because your operators can weld faster with G-E Inert-Arc welders, less gas and power are consumed. Saving in power costs and gas consumption have been estimated as high as 25% using G-E Inert-Arc welders, because of Idlematic control, series capacitors and momentary high-frequency pilot.

Holders and Tungsten Electrodes Are Designed for High-speed Work

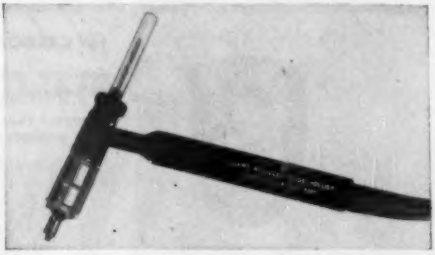
An operator can adjust by hand a tungsten electrode in the illustrated holder. No wrenches are required.

And he can do a wide variety of jobs with the same holder. Using it with a 200-ampere G-E Inert-Arc welder, for example, an operator can weld both light- and medium-gage materials, with electrodes up to eight inches in length in diameters of .040, $\frac{1}{16}$, $\frac{3}{32}$, $\frac{1}{8}$, and $\frac{5}{32}$ inches.

To give you the right electrode for any job, G.E.'s 99.9% pure tungsten is available in a wide variety of diameters and lengths in both standard and thoriated types.

ASK ABOUT G.E.'s THORIATED TUNGSTEN

For d-c Inert-Arc welding only—you get 10 times normal electrode life with thoriated tungsten electrodes. Its strength compares with standard pure tungsten. Write today for more information. *General Electric, Schenectady, N.Y.*



Holders for G-E Inert-Arc welders are available for any current requirement from 15 amperes to over 800 amperes, a-c or d-c.

GENERAL ELECTRIC

711-15

REGO

HIGH PRESSURE
CYLINDER
VALVES

for OXYGEN and HYDROGEN

Designed, tested and proved for high pressures and severe service.

Packing may be replaced with cylinder under pressure if necessary.

Fuse plug and bursting disc provide positive safeguard.

Bronze stem furnished as standard, also available with monel stem on special order.

for ACETYLENE

Cadmium-plated steel stem with monel tip resists rust and wear.

Ball-nose seat construction assures positive shut-off.

for CARBON DIOXIDE

Available with diaphragm-type or packed-type construction.

Compact rugged design for use with high pressures.

Equipped with bursting disc safety device.

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PIONEER AND LEADER IN THE DESIGN AND MANUFACTURE OF PRECISION EQUIPMENT FOR USING AND CONTROLLING HIGH PRESSURE GASES

Steel Scrap Shortage Becoming Critical

STOCKS of iron and steel scrap are at about one-half of a safe working inventory reports the scrap committee of the American Iron and Steel Institute. In 1950 more than 29,000,000 tons of purchased scrap were consumed in this country to produce 96,700,000 tons of steel ingots and castings.

With the expansion of new steel making capacity going forward rapidly, there may be a potential scrap deficiency of from five and seven million tons between now and the end of 1952.

Sources of scrap are many, but lately it is evident that some must be developed faster than at any former time, namely, the domestic and farm supplies. Tin cans should be collected and detinned. It is estimated that the 6,000,000 farms in this country may yield about 500 lb of scrap each. Other sources are old ships, beached and damaged ships off World War II beachheads, obsolete war material that is still stored and scrap from war-damaged foreign countries.

* * *

Burdett Oxygen Opens Plant at Dayton, Ohio

MAY 1 WAS the scheduled opening date for the Burdett Oxygen Company's plant at 1223 McCook Ave., Dayton, O. The new plant is situated on a plot of three acres and has 15,000 sq ft of manufacturing and office space in addition to 4,000 sq ft of loading dock.

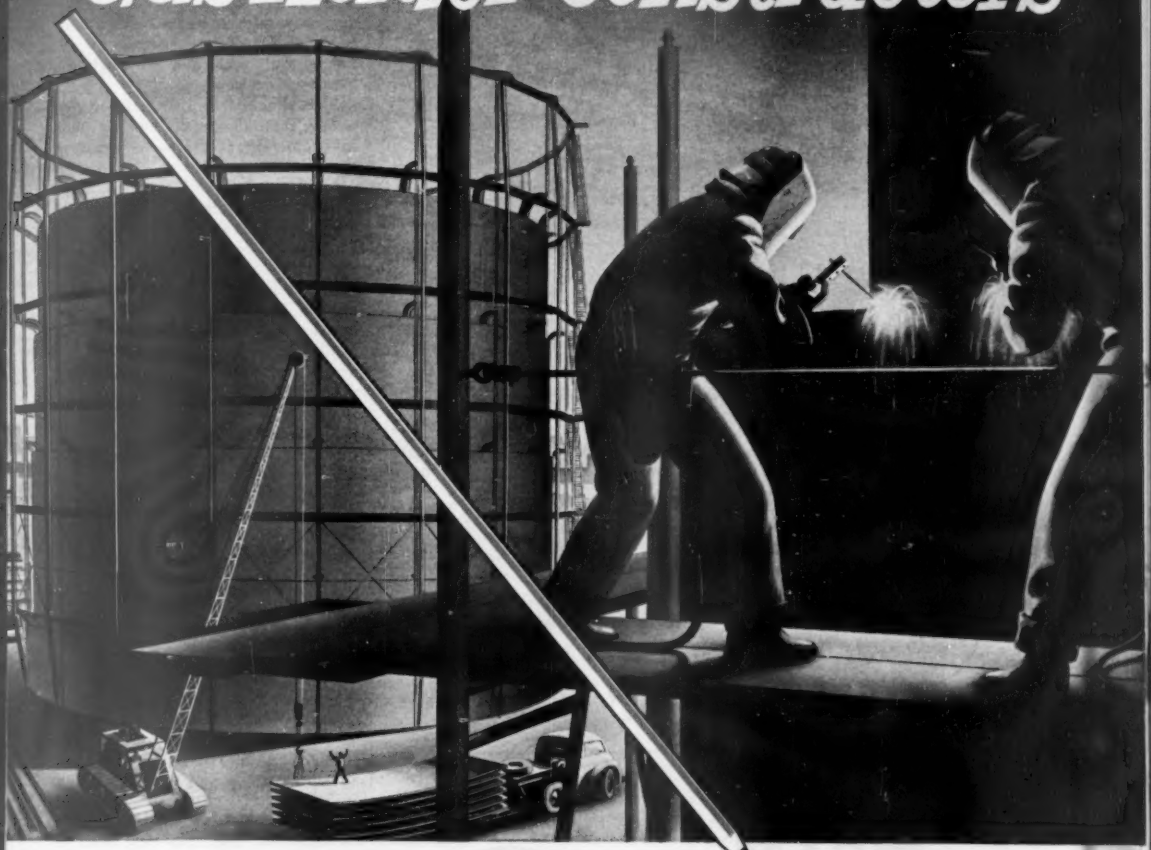
The modern and efficient oxygen plant will produce 7,500,000 cu ft of oxygen per month and a large amount of nitrogen. Additional facilities will be added for the production of acetylene and propane. Functioning as a distributor also, the Burdett Dayton branch will stock the company's complete line of industrial and medical gases plus the Burdox line of welding and cutting equipment.

* * *

Goodrich Welding Changes Management

BERT Woldring of Grand Rapids, Mich., has been named president and general manager of the Goodrich Welding Equipment Corp., Reed City, Mich. Woldring, Jesse C. Girod and Arend Bruinsma, also of Grand Rapids, recently purchased control of Goodrich. The company manufactures resistance welding equipment for automotive and appliance manufacturing plants.

11 out of 14 Gas Holder Constructors



Of the fourteen leading builders of gas holders in the U. S., eleven have long been regular users of Murex Electrodes.*

In both shop fabrication and field erection work, Murex Electrodes speed welding—assure top welding quality. That is why welding engineers in this and many other industries prefer Murex.

*All those who have AAAA directory financial ratings

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ELECTRODES • ARC WELDERS • ACCESSORIES

Your Arcos Field Engineer
Can Help
KEEP YOUR PRODUCTION GOING

Application Chart
ARCOS STAINLESS, LOW HYDROGEN, NON-FERROUS ELECTRODES

Your Arcos representative can be more helpful to you now than ever before. He can help you—

- Select electrodes to meet defense specifications
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- Locate available electrodes of a different diameter that can do the job
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Get in touch with your Arcos representative today. He will do his best to help you keep your production rolling.

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Send for this ARCOS Application Chart.

WELD WITH

ARCOS

Specialists in Stainless, Low Hydrogen and Non-Ferrous Electrodes

Warns that U. S. Faces Technical Manpower Shortage

AMERICAN INDUSTRY is facing a technical manpower shortage that threatens to become critical in the near future. The warning was made by H. N. Muller, Jr., of Pittsburgh, assistant to the engineering vice-president of Westinghouse Electric Corp., during an address to the Southeastern Electric Exchange meeting at St. Petersburgh, Fla. The Westinghouse executive declared:

"We should frown severely on any policy that allows our young men in engineering colleges to enlist in the military in droves, just out of panic. It has to become perfectly clear to our people that dissipation of trained manpower, if it continues, comprises a real threat to national security."

Mr. Muller pointed to figures showing the diminishing number of engineering graduates expected to be available to enter industry in the next several years.

During the past two years, he said, U. S. engineering schools graduated approximately 50,000 young men each year and this tremendous number was assimilated by industry very rapidly. Even last summer, however, a shortage was becoming apparent. Through 1950, the manpower needs created by World War II plus the industrial expansion since the war had not yet been completely satisfied.

"Now, in 1951, we are going to have about 32,500 new graduates added to our technical reservoir," the speaker declared. "We know that this figure is not enough, as is evidenced by the scramble for men on the campuses of the country this spring. It is not uncommon to meet an engineering senior walking around with five or six job offers.

"Looking beyond 1951," he continued, "we run headlong into a more serious situation. According to estimates from the United States Office of Education, in 1952 the number of graduates will decline to 25,000; by 1953 to 20,000; and by the year 1954, statistics indicate a maximum of 17,000 engineering graduates. . . . The shortage of engineers—a cumulative total of 105,500—becomes a very clear and very serious situation when analyzed in the light of such figures. It will be even more acute since our figures assume that none of these men will enter the military—a condition that obviously won't happen."

Efforts are being made to plug the technical manpower gap, Mr. Muller reported.

You can still count on K-G for good delivery of dependable equipment!

K-G

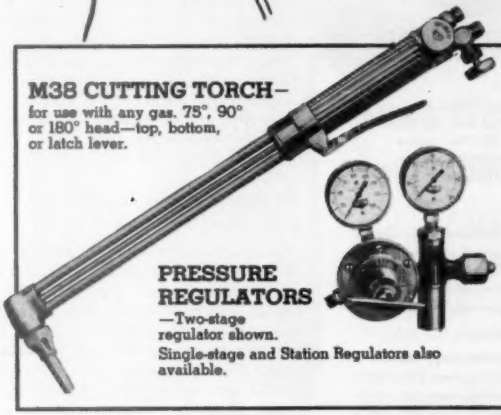
CUTTING TORCHES

•

WELDING and CUTTING COMBINATIONS

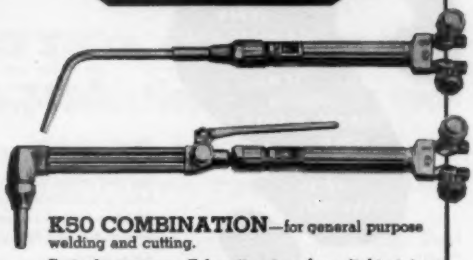
•

REGULATORS



M38 CUTTING TORCH—for use with any gas. 75°, 90° or 180° head—top, bottom, or latch lever.

PRESSURE REGULATORS—Two-stage regulator shown. Single-stage and Station Regulators also available.



K50 COMBINATION—for general purpose welding and cutting.

Fast change-over. Takes tip sizes from lightest to heaviest. E50 COMBINATION for light and medium work.

"TIMES ARE TOUGH—material shortages and substitutes can hold any manufacturer down. But this K-G equipment came through fast—and came through *right*.

"Good thing, too, because there's a lot of stuff going through here—and there's going to be a lot more. With this K-G equipment we sure can handle the jobs we've got—and know we'll be able to handle the jobs we'll *get*.

"That's because K-G equipment works right when it comes in—and keeps on working right. Works *with* you, too. The torches have just the balance you want, and the valves are easily adjusted to provide steady, even flow.

"Take a tip from me—if you want cutting and welding equipment that will really do a job for you—and you want it soon—get in touch with your K-G Distributor, or write in to K-G."

WRITE FOR OUR CATALOG — SHOWS THE WHOLE K-G LINE

K-G

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Sold in Canada under the name "WELDCO"
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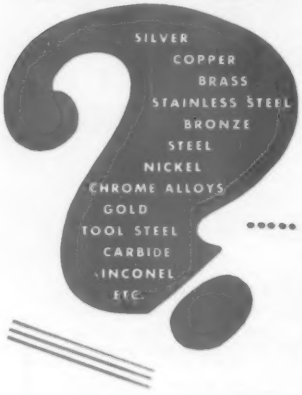
NATIONAL WELDING SUPPLY ASSOCIATION MEMBER

KG ...Since 1914, symbol of satisfaction on GAS WELDING AND CUTTING EQUIPMENT



Every day more and more fabricators are learning that GB Silver Solder with GB Flux makes an unbeatable production team for low temperature brazing.

From the GB line of six standard silver solders you can select the one which will fully meet your production specifications. Yes, with GB Silver Solders you get sound, low-cost joints on virtually any ferrous or non-ferrous metal.

GB Standard Silver Solders:

GB No. 50 Silver Solder, melting range 1160-1175°F
GB No. 50N Silver Solder, melting range 1240-1260°F
GB No. 45 Silver Solder, melting range 1125-1145°F
GB No. 41 Silver Solder, melting range 1125-1160°F
GB No. 35 Silver Solder, melting range 1130-1270°F
GB No. 31 Silver Solder, melting range 1130-1300°F

For special jobs where special silver solders are required, GB offers you competent technical assistance, backed by over 80 years of experience in alloying and refining precious metals.

GB FLUXES

The physical properties and appearance of a brazed joint are controlled to a large degree by the flux which is used. For this reason it will pay you to team-up GB Flux with GB Silver Solder — they were developed to produce maximum results when used together.

GB DATA BOOK

Here's real factual data on all of the important phases of low temperature brazing. You can get a free copy from your GB Distributor — Write us and a copy will be forwarded to you.

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Suppliers of Precious Metals to Industry Since 1867

Radioactive Isotopes Tell Steel's Secrets

BETTER steels will be forthcoming from the use of radioactive isotopes in steel research, predicts the American Iron and Steel Institute. One of the best known of such isotopes is Cobalt-60, used for radiographic inspection (see THE WELDING ENGINEER, December, 1950).

Another radioactive isotope, carbon 14, is used to study the distribution of carbon in steel, its segregation habits and the mechanism by which it causes steel to harden. Studies with carbon 14 must be carried out far from steel plants, however, since minute quantities of this radioactive element in a heat of commercial steel would ruin it for many purposes. For 5,100 years (carbon 14's period of half-disintegration), that particular steel would fog photographic film or disturb chemical or biological processes.

Other studies using radioactive isotopes seek to determine the method of changes in metal during heat treatment, the solubility of calcium in liquid iron, the ionic properties of slags, the method of formation of scale and the segregation of tungsten in high temperature materials.

* * *

Straightening by Torch Cuts Steel Box Cost

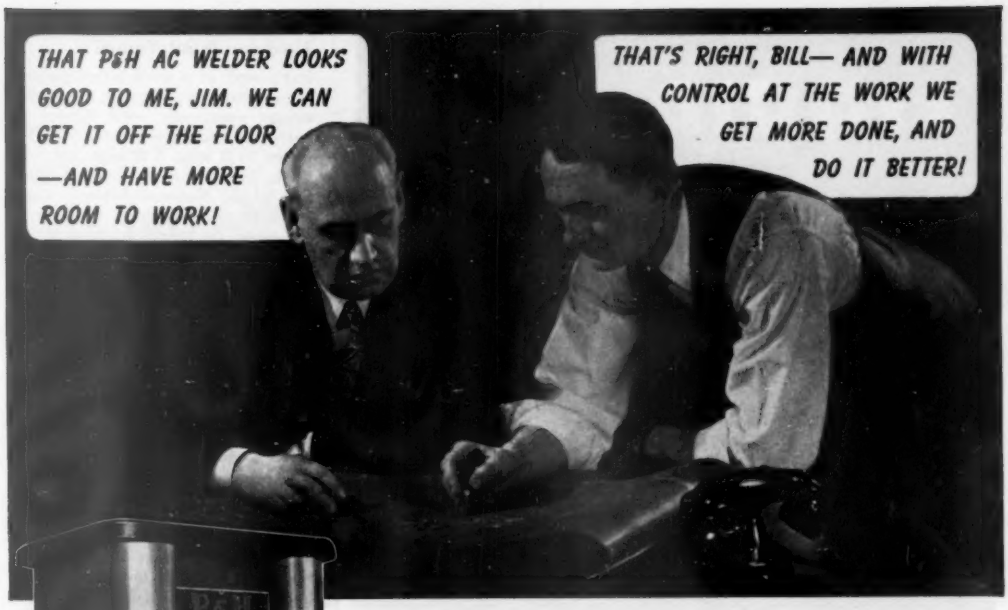
FLAME-STRAIGHTENING is saving a West Coast fabricator about $2,000 a year, according to word from The Linde Air Products Co. The method was adopted to straighten about a hundred heat-warped steel boxes each year. The boxes have sides 16 by 4 ft and are topped with 12-in. extra-heavy channels. Former method of cold straightening utilized a 50-ton jack plus considerable cutting and rewelding.

The new method consists of heating a triangular patch in the sides of the boxes while force is applied with the jack. This pulls the sides back into shape. A twist caused by the heat exposure is also corrected by the flame straightening.

* * *

Rebored Tunnel Gets Welded Rail Strings

MORE than 5½ miles of welded rail were recently laid in the rebored Elkhorn Tunnel of the Norfolk & Western railroad. There were 24 strings 1,000 ft long of the flame-cleaned and oil-coated rail, according to the Oxweld Railroad Service Co. The welded rail is expected to greatly reduce track maintenance in the tunnel.


THAT P&H AC WELDER LOOKS GOOD TO ME, JIM. WE CAN GET IT OFF THE FLOOR —AND HAVE MORE ROOM TO WORK!
THAT'S RIGHT, BILL— AND WITH CONTROL AT THE WORK WE GET MORE DONE, AND DO IT BETTER!

Save floor space, cut welding time for more production at lower cost

. . . . use P&H AC Arc Welders with exclusive Dial-lectric remote control

Give yourself more room for your production needs. Mount your P&H Welder off the floor, out of the way.

Dial-lectric remote control lets you do this. Your operator can turn the heat on *at the work*. It also cuts down his "walking time" . . . turns it into *welding* time for increased output.

Besides saving space P&H Dial-lectric control eliminates cores, coils, sprockets, gears and other moving parts that cause excessive maintenance and downtime.

P&H AC Welders are available in a full range of sizes up to 625 amps. See your P&H representative or distributor for full details on how this outstanding welder can save you time and money.

ADDITIONAL FEATURES OF P&H AC ARC WELDERS

- Easy, quick-start arc
- Stable arc
- No arc blow
- Continuous, step-less amp control
- High electrical efficiency for lower power costs
- Connectable to 220 or 440 volts
- NEMA rated

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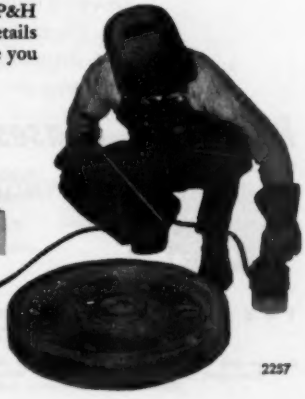
4513 W. National Avenue
Milwaukee 14, Wis.

HARNISCHFEGER CORPORATION



Excavators • Overhead Cranes • Hoists • Arc Welders and Electrodes • Soil Stabilizer • Crawler and Truck Cranes • Diesel Engines • Cane Loaders • Pre-assembled Houses

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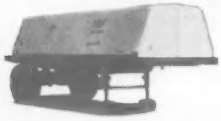
Whether you're building a battle wagon or doing simple soldering, it will pay you in time and money saved to talk with "LIQUID" *first!* "LIQUID'S" complete, wide-variety line of welding and cutting equipment meets every industrial need —standard units can perform all types of special work. From torches to gases, "LIQUID" is a single, dependable source of unfailing supply! *Write today for new GASWELD catalog—it's free!*

Plus DEPENDABLE Gases IN ANY QUANTITY



"LIQUID" Red Diamond Oxygen, Acetylene, Nitrogen and Hydrogen

Trailer trucks in capacities up to 45,000 cubic feet of oxygen simplify gas supply for larger users

THE LIQUID CARBONIC CORPORATION
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Oxygen and acetylene producing plants and distributing points are located in Philadelphia, Buffalo, Cincinnati, Louisville, Toledo, Detroit, Milwaukee, Chicago, San Francisco and Los Angeles (Stuart Oxygen Company) and Canada (Imperial Oxygen Limited).

Welded Stainless Used for Wind Tunnel

EXPANSION of a wind tunnel passage for accurate air control on the world's largest supersonic wind tunnel involves the use of welded stainless "W" plates 35 ft long, 8 ft high and 1 in. thick. Installed at the Lewis Laboratory of the National Advisory Committee for Aeronautics facilities at Cleveland, the tunnel produces air velocities that are 1.4 to 2 times the speed of sound (760 mph at sea level) in a test section measuring 8 by 6 ft.

To produce this high velocity, the air first leaves a compressor at high pressure and low speed. Moving into the tunnel through a small entrance funnel or throat, the air reaches the speed of sound. As the tunnel passage is further expanded, the air accelerates to supersonic speeds.

Expansion of the tunnel passage is controlled by flexing the big stainless plates. They are moved inward and outward by hydraulically operated screw jacks, fourteen for each plate, according to *Nickel Topics*, published by The International Nickel Co., Inc.

Stainless is used because any corrosion on the inside surfaces of the tunnel would cause turbulence that disturbs test calculations. This steel also stands repeated flexing without taking a permanent set. To avoid any chance of corrosion, the air is also dried by passing it through beds of activated alumina before it goes into the compressor. At maximum operating conditions as much as 2,000,000 cu ft of air per minute is drawn into the tunnel. Two million cu ft of air weighs 75 tons.

The steel, a special alloy developed by U. S. Steel Corporation during the last war, was made in an electric furnace at Duquesne, Pa. It was rolled into plate 1⅝ in. thick and rough machined at Carnegie-Illinois' Homestead, Pa., works. From Homestead, the plates were delivered to the Ambridge, Pa., plant of American Bridge Co.

Back-up beams were welded to the backs of the plates at Ambridge to strengthen them. At the bottom of the transverse beams, rollers were welded. Returned to Homestead Works, heat-treating and straightening of the plates were accomplished. The inside surfaces of the plates then had to be machined and polished by the Continental Foundry and Machine Co. At the Ambridge plant again, the plates were completely assembled. After being taken down and sent to NACA, they were erected in the tunnel.

Stainless W is a precipitation-hardening chromium-nickel stainless containing aluminum and titanium.

THIS CASTING
WAS DOOMED
FOR THE SCRAP PILE!

A SMART WELDER SAVED IT with NI-ROD

When this 300-pound pipe guide barrel casting was delivered to a tube mill, it was found that all four projections were 1/4" too small. The casting was useless . . . until a smart welder got ahold of it.

This is what he did!

He ground down each projection. Then, using 5/32" diameter Ni-Rod electrodes, he laid down three layers of Ni-Rod (about 9 lbs.). Because it was Ni-Rod the deposits were easily machined to the correct dimensions within a tolerance of minus .032". No pre-heat was required.

The result?

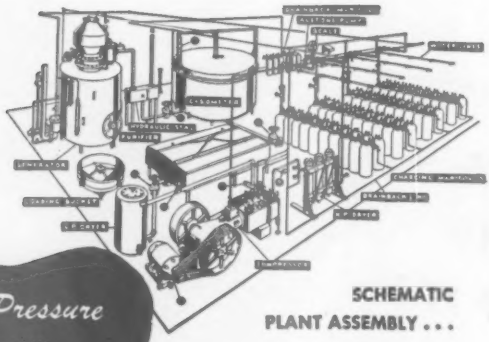
A $150 casting, plus the time required to recast it, was saved with only $15 worth of Ni-Rod. This is another case where Ni-Rod's ability to salvage defective or mismachined parts is effectively demonstrated.

In addition to salvaging castings, Ni-Rod is an outstanding maintenance tool for repairing worn out parts which would otherwise represent a loss in time and material.

Now that the nickel supply is being diverted to essential defense needs, you may not be able to get all of the Ni-Rod you want. But if you require technical assistance on any welding problem, you can still count on the full cooperation of INCO's Technical Service Section.

EMBLEM OF SERVICE
INCO
TRADE MARK

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.



A *Low Pressure*
ACETYLENE
PRODUCING
PLANT
that Charges up to
160 CYLINDERS
at ONE TIME

SCHEMATIC PLANT ASSEMBLY . . .
showing placement of the various units that comprise the plant.

This plant layout provides for extremely simple operation and exceptionally low maintenance costs. Ample storage space is also provided for filled tanks. Being compactly designed the chief operator has all operations under surveillence at all times. Rated capacity of this assembly is 2700 cu. ft. per hour.

We invite your inquiries

INDEPENDENT ENGINEERING COMPANY, Inc.
CONSULTING · DESIGNING · RESEARCH
Manufacturers of
CYLINDERS AND GAS PRODUCING EQUIPMENT
ACETYLENE · OXYGEN · HYDROGEN · NITROGEN
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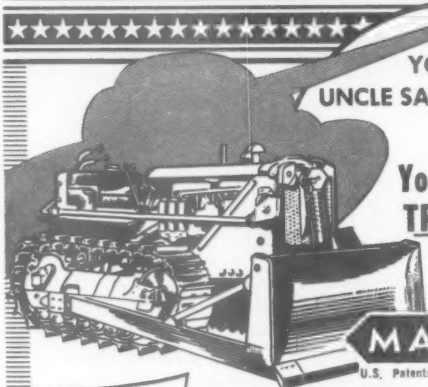

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UNCLE SAM BUILD TANKS
When
You Salvage Worn
TRACTOR PARTS
with . . .
MANGANAL
U.S. Patents 1,876,736—1,947,167—2,021,945

Write TODAY for FREE Literature . . . outlines newest methods of economical repairs.
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11%-13½% Manganese-Nickel Steel
WELDING PRODUCTS

1. Use MANGANAL BARE ELECTRODES to rebuild worn Tractor Drive Sprockets, Track Rollers and Idler Wheels.
2. Use MANGANAL ROUND or SPECIAL SHAPE APPLICATOR BARS to repair edge of Tractor Blade.
3. Use MANGANAL FLAT APPLICATOR BARS to repair worn Tractor Corner Bits.
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STULZ-SICKLES CO.
SOLE PRODUCERS
92 N. J. Railroad Ave.
Newark 5, New Jersey

P. R. Mallory & Co. Backs New Titanium Corporation

A JOINTLY OWNED company for the development, production and marketing of titanium and titanium alloys has been formed by P. R. Mallory & Co., Inc., Indianapolis, and the Sharon Steel Corp., Sharon, Pa. The company will be known as the Mallory-Sharon Titanium Corp., and its offices will be located initially in Indianapolis.

P. R. Mallory, head of the concern that bears his name, will be chairman of the board of the new titanium producer. James A. Roemer is president; F. H. Vandenburgh, vice-president and general manager; E. N. Crosier, treasurer and assistant secretary; and George Fotheringham, secretary and assistant treasurer.

P. R. Mallory & Co. has been active in titanium research for the last decade and has done extensive development work for the Navy Bureau of Aeronautics on new titanium alloys. Well known for its accomplishments in the field of special metallurgy, Mallory has both research laboratory facilities and an engineering staff qualified to handle the titanium alloy project. Sharon Steel Corp., a fully integrated producer, has the facilities needed for rolling and further fabricating operations. One of its subsidiaries, the Niles Rolling Mill Co., Niles, O., has gained rolling experience on large titanium sheets.

Mr. Roemer, the president of the new titanium company, is also president of the Niles Rolling Mill Co. Mr. Vanderburgh, the vice-president and general manager, is division manager, special metals division, P. R. Mallory & Co., Inc. Mr. Crosier is secretary-treasurer of Sharon Steel Corp.

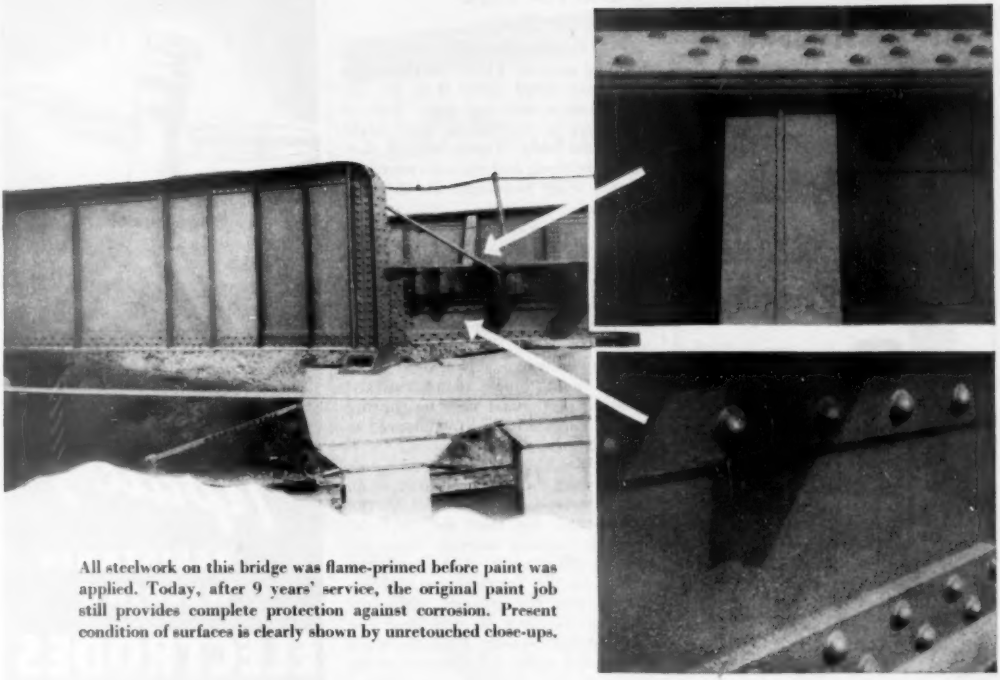
• • •

Chicago Gets Frozen Ore from Mesabi Range

DURING the sub-zero days of last winter, experimental shipments of frozen ore from Mesabi range deposits in Minnesota were sent to the United States Steel Company's South Chicago plant. It was the first time ore was shipped by rail in the winter.

The frozen ore had to be thawed by a special steam process, carried out on a siding near the plant. Four old locomotives leased from the Burlington Railroad provided the steam that warmed the ore.

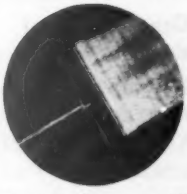
The carload of ore was pierced with a steel pipe to carry the steam inside the load. The steam works through the load to drive out the frost in about eight hours.



All steelwork on this bridge was flame-primed before paint was applied. Today, after 9 years' service, the original paint job still provides complete protection against corrosion. Present condition of surfaces is clearly shown by unretouched close-ups.

Your Steelwork . . .

How Will It Look in 1960?



Steelwork you coat with good paint today can still look like new ten years from now, *if you flame-prime all exposed surfaces first.* And what you'll save on maintenance, because of increased protection due to flame-priming, will more than pay for all the flame-priming apparatus and materials you need for the job.

Flame-priming is simple to do, requires little equipment, and costs little. A brush of oxy-acetylene flames pops off scale and drives out moisture. Paint applied to the warm, dry surface goes on quickly and smoothly, bonds tightly, and lasts longer.

Flame-priming is one of many time- and money-saving LINDE methods for making, cutting, joining, treating, and forming metals. So, whatever you do with metals, there is a good chance that LINDE know-how, show-how, and equipment can help you do it better, more quickly, or at lower cost.

To find out, without obligation, telephone or write our nearest office today. LINDE AIR PRODUCTS COMPANY, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. Offices in Other Principal Cities. In Canada: Dominion Oxygen Company, Limited, Toronto.

Linde Trade-Mark

Products and Processes for MAKING, CUTTING, JOINING, TREATING, AND FORMING METALS

The term "Linde" is a registered trade-mark of Union Carbide and Carbon Corporation.

Keep costs down by saving valuable flux

KENT

SUCTION CLEANER for Flux Recovery

PAYS FOR ITSELF by salvaging valuable flux . . . and it's easily adaptable to any type of welding application. Unused flux and small fused particles from the weld are picked up and screened . . . dust is removed . . . and the clean flux is deposited in the lower tank to be re-used as needed!

DEPENDABILITY is built into every KENT product . . . and 38 years of experience in the vacuum field stands behind it. The KENT Suction Cleaner for Flux Recovery is engineered for service . . . and built to last!

Full information is available upon request—no obligation!

KENT

Commercial Vacuum Cleaners • Floor Machines • Furnace Cleaners • Dry Floor Scrubbing Machines

THE KENT COMPANY, Inc.

436 Canal Street • Rome, N. Y.

Welded Fire Truck Accelerates Fast

TO SAVE precious seconds in reaching burning aircraft, a new Air Force fire truck can speed 5,000 ft in 80 seconds from a standing start. Part of its speed is due to its lightweight aluminum body. Tanks, heaters, fire-fighting turrets and controls were fabricated from aluminum by inert-arc welding.

The truck will operate at temperatures ranging from 125 F to minus 65 F, in winds up to 20 knots. For use in cold climates, its has a 24-volt auxiliary engine generator that powers heaters in the engine block, oil pan and tanks. Though the gross weight of the truck is 37,000 lb, it has a light touch, comparatively. Pressure per square inch on the tire ground surface is 35 lb, compared to 90 for a former model.

Twin fire-fighting turrets, each containing four nozzles, are mounted on the front fenders. These nozzles can throw steam, fog, foam and sno-foam onto the burning airplane while the truck is still moving. A high-pressure pump on the forward part of the chassis can be engaged while the truck is traveling 40 mph and can pump at full capacity while the truck moves at 5 mph. In addition to the fender turrets, there are two ground sweeps that project beneath the front bumper and a pair of hand hose lines that are coiled within the aluminum sides. The truck carries two 50-gal foam tanks, two water tanks of 500 gallons each and a high pressure 200-lb capacity carbon dioxide system.

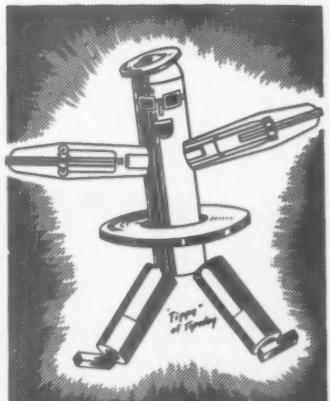
The cab of the truck holds five men. It is enclosed behind double windows with space for air circulating between the panes of heat resistant glass. The air inside the cab is thermostatically controlled to compensate for both arctic and torrid temperatures. The aluminum body and other fittings were assembled and welded by Hurst Industries, San Jose, Calif.

* * *

Bureau of Shipping Okays Welded Repairs on Shafts

WELDED REPAIRS on fractured propeller shafts will be accepted by The American Bureau of Shipping on the conditions that: (1) the owners request it and (2) that welding is done at shipyards where Navy procedures and controls have been established. Instructions as to the requirements for qualifications have been sent out to the Bureau's surveyors.

It is believed that broken shafts hitherto considered unfit for further service can be salvaged by welding.



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RESISTANCE WELDING

ELECTRODES

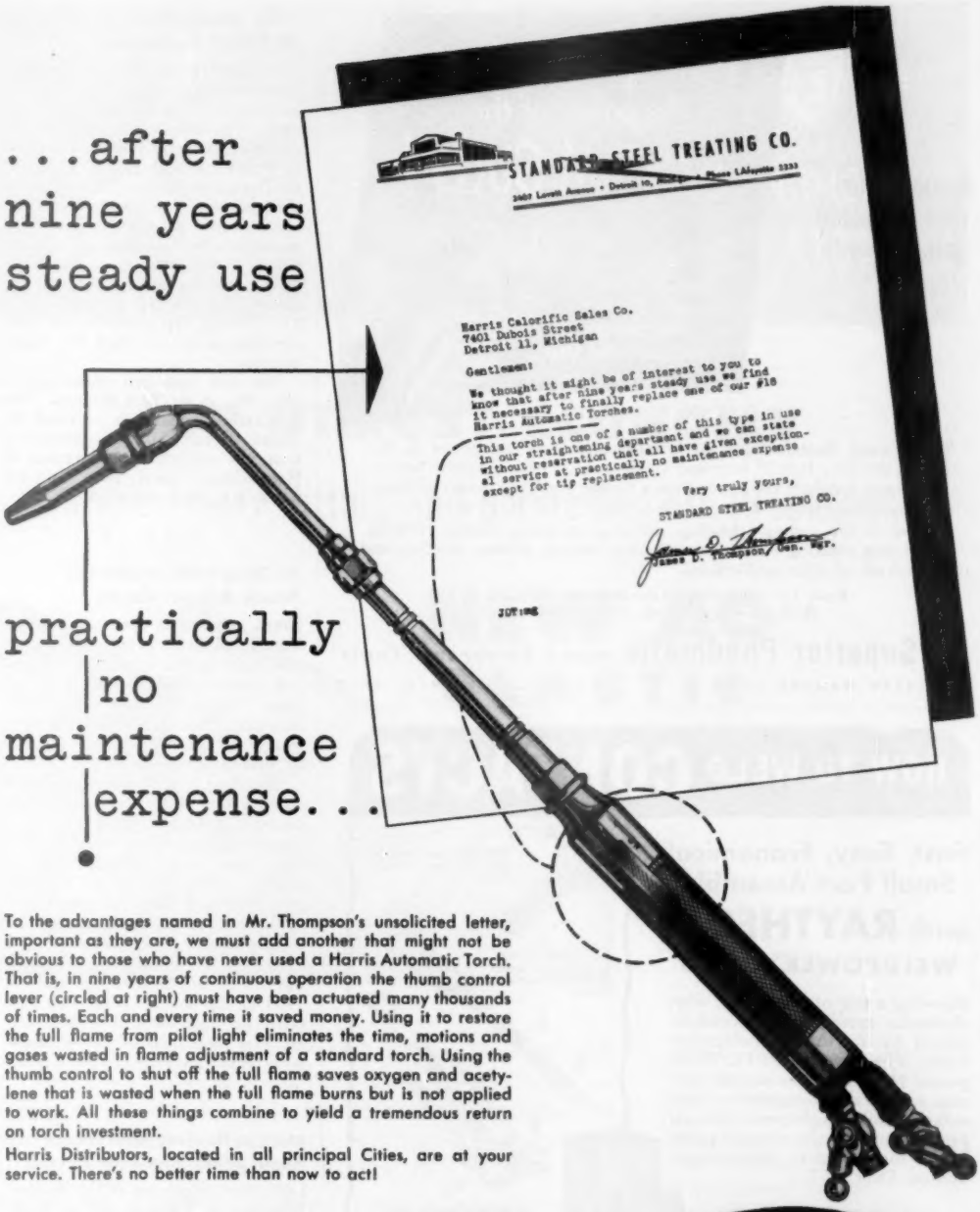
- **Longer life.**
- **Less redressing.**
- **Less mushrooming.**
- **Greater current density.**
- **Extraordinary continuous service under heavy production stresses.**
- **Cuts production costs, yet costs no more than the ordinary electrode.**

Write today for test samples and "The Story of STRAIGHT LINE Conductivity."

Tipaloy INC. 1435 E. MILWAUKEE DETROIT 11, MICHIGAN

Offices in Principal Cities

...after nine years steady use


STANDARD STEEL TREATING CO.
Harris Calorific Sales Co.
7401 Dubois Street
Detroit 11, Michigan
Gentlemen:
We thought it might be of interest to you to know that after nine years steady use we find it necessary to finally replace one of our #18 Harris Automatic Torches.
This torch is one of a number of this type in use in our straightening department and we can state without reservation that all have given exceptional service at practically no maintenance expense except for tip replacement.
Very truly yours,
STANDARD STEEL TREATING CO.
James D. Thompson, Gen. Mgr.

practically no maintenance expense...

To the advantages named in Mr. Thompson's unsolicited letter, important as they are, we must add another that might not be obvious to those who have never used a Harris Automatic Torch. That is, in nine years of continuous operation the thumb control lever (circled at right) must have been actuated many thousands of times. Each and every time it saved money. Using it to restore the full flame from pilot light eliminates the time, motions and gases wasted in flame adjustment of a standard torch. Using the thumb control to shut off the full flame saves oxygen and acetylene that is wasted when the full flame burns but is not applied to work. All these things combine to yield a tremendous return on torch investment.

Harris Distributors, located in all principal Cities, are at your service. There's no better time than now to act!

THE HARRIS CALORIFIC COMPANY

Cleveland 2, Ohio

HARRIS

SERVING THE METAL INDUSTRY SINCE 1905

Scales and cleans welded joints easily

Don't Underestimate the power of the BANTAM BULLY!

13,000 sharp, effective blows a minute! ...sharp enough to cut cold rolled steel!

The amazing Bantam Bully air hammer gives you real power in an easy-to-use size. It is 5" long and weighs only 22 ozs. Exclusive metering trigger regulates the power from a feather touch to a powerful blow. Full speed and power attained on less than 6½ C.F.M. of air.

Use it for scaling, chiseling, peening, tamping, cutting, routing, grooving, caulking, channeling, chipping, driving, drilling, marking, and hundreds of other applications.

Write for full details on the Bantam Bully, Big Bully, Bully blow gun and the Bully Fulflo air filter.

Superior Pneumatic division of **Herbrand Tools**

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HOW TO WELD CONTACTS

Fast, Easy, Economical Small Part Assembly with RAYTHEON WELDPOWER* UNITS

Showing a few of the infinite ways dissimilar metals are successfully joined by Raytheon Weldpower Units. The new Model G. Weldpower Head provides precise control and ready adaptability that makes possible high speed, low cost production assembly of small parts. Write for complete information. Address Dept. WE-5.

WELDING steel backed silver contact to brass stud.
HOT UPSETTING silver rivets into punched spring leaves.
SANDWICHING beryllium copper leaves between coin silver contacts.

Raytheon Condenser Weldpower Control Units for Model G. Weldpower Heads are available in 65, 225, 1080 watt-second capacities.

*Reg. U. S. Pat. Off.

RAYTHEON
Excellence in Electronics
RAYTHEON MANUFACTURING COMPANY
WALTHAM 54, MASSACHUSETTS

"The Fourth Man" Tells Story of What's Happening to U. S.

YOU WON'T FIND "The Fourth Man" billed at your neighborhood movie house, but it's worth seeing just the same. This unique new slidefilm was produced at the request and expense of Walter Harnischfeger, president of the Harnischfeger orp., Milwaukee, to tell just what's happening to American economic principles today. Government is the "fourth man" and the villain of the little piece. The other three men—business, labor and the farmer—must accept the responsibility of seeing that governmental costs are kept in line or face the consequences.

Just how costs are created gets a play, too, as the film develops. The 118-frame slidefilm is narrated by André Baruch. You may borrow it from the advertising department of Harnischfeger Corp., 4400 West National Ave., Milwaukee 14.

• • •

Six-Year Steel Investment Nearly $25 per Capita

STEEL COMPANIES spent the equivalent of $24.50 for every man, woman and child in this country to expand and improve facilities during the six years 1946 to 1951, according to the American Iron and Steel Institute. Nearly all that money was supplied by private enterprise.

This year steel companies will spend about $1.2 billion, more than double the highest previous annual expenditure and about equal to what they spent from 1940 to 1945 inclusive. From 1940 to 1951, inclusive, iron and steel companies will have spent a total of $4.8 billion for expansion and improvement.

About 18.1 million tons is scheduled to be added from the start of 1950 to the end of 1952. The total three-year increase will be the largest ever accomplished in a short-term period anywhere in the world.

• • •

Bastian-Blessing Old-Timers Show 2,960 Man-Year Record

LONG-TIME employees at The Bastian-Blessing Co., Chicago, are no standouts. Eight men have been with the company more than 40 years, 62 have had 25 years service and 109 have been on the job for more than 10 years. Since the company hires only 779 men at present, this is quite a service record. These 179 men have worked a total of more than 2,960 man-years for Bastian-Blessing.

FOR UTMOST ECONOMY

where Heavy Pitting and Scratching are Problems

NEW AO PLASTIC COVER PLATE

Here's a new cover lens of clear, hard, thermally set plastic made to exacting AO quality standards that compares in smoothness and lustre with polished plate glass. ITS SUPERIOR RESISTANCE TO ABRASION MAKES IT IDEAL FOR WELDERS IN PROTECTING AGAINST PITTING BY WELDING SPATTER. Its long life in severe duty and ease of cleaning with soap and water or solvents represent the utmost in cover-glass economy and service. Your nearest AO Safety Products Representative can supply you.

QUICK FACTS

- Superior resistance to spatter and pitting
- Optically correct
- Clear—won't discolor under ordinary welding conditions
- Protects against eye fatigue due to obstructed vision—boosts production
- Highly resistant to breakage
- Won't peel, blister or shrink in service

1/16" thick approximately — smooth edged, as flat as plate glass, highly polished

American Optical Company
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

Better than Ever!

THERMO

TRIPLE DUTY
SPATTER-PROOF
PLASTIC COATED
COVER LENSES

NEWLY IMPROVED for TRIPLE DUTY

Positively guaranteed to COST LESS PER WELDING FOOT than any type Cover Lens, whether plain glass, solid plastic, sprayed or plasticised.

THERMACOTE CO.
NEWARK CHICAGO LOS ANGELES PORTLAND

New X-Ray Machine to Save Our Tin

AN AUTOMATIC testing device that combines Geiger counters and X-rays is expected to save many tons of scarce tin annually. This useful gadget, developed by scientists of United States Steel Corp., went into operation last month at the Gary Sheet and Tin mill, Gary, Ind. Enough tin plate will be saved annually at Gary to manufacture 1,000,000 tin cans, state U. S. Steel executives.

Similiar equipment will be used in the company's Irvin works in Pittsburgh and by two other U. S. Steel subsidiaries: the Pittsburg, Calif., plant of Columbia Steel Co. and the Birmingham plant of Tennessee Coal, Iron and Railroad Co.

The new instrument—the product of two years' research—uses Geiger counters to measure X-rays reflected from the tin-coated steel sheet. The measurement of X-rays then determines the thickness of the tin. Basically, the machine consists of two X-ray tubes—one mounted above the test sheet and the other below it. The count of the Geigers, showing the strength of the reflected X-ray beams from the sheet, is recorded on a paper tape and used for calculating the amount of tin on the test sheet.

Under the old method of measurement, sheets that were used in making the metallurgical tests became scrap. With the new machine, no tin is lost in testing.

* * *

Iron Ore Imports Hit Record High in '50

NEARLY 9.2 million net tons of iron ore was imported into the United States last year from 15 foreign countries. According to the American Iron and Steel Institute, this represents the largest amount ever imported, exceeding the 1949 total by about one million tons.

Imports of ore in 1950 were about 8% of the domestic production of iron ore, which is double the proportion existing in 1946. With numerous foreign mines now being developed, continued expansion in imports is promised.

The largest foreign suppliers of iron ore to the United States last year were Chile, Sweden and Canada-Newfoundland, in the order named. The largest increases in 1950 imports came from Brazil, British West Africa, Algeria and Mexico. Venezuela promises to rival Chile for first place in the near future.

HOBART
(E-6010)
electrode 10

Faster, Smoother
—non-porous welds in all positions

Maybe some E-6010 electrodes are hard to handle. But not the Hobart "10". You'll find that this new and versatile all-position electrode gives you real welding ease—PLUS—deep penetration, high tensile strength and ductility, quick and easy slag removal, a stable arc, and non-porous welds.

The Hobart "10" is widely used in structural work, ship building, pipe line construction, etc. Its penetrating arc makes it ideal for welding galvanized plates.

Yes, the Hobart "10" is years ahead of any electrode you may be using. But don't take our word for it. Instead, write us today for complete information and free samples to try on your next job. You'll be glad you did.

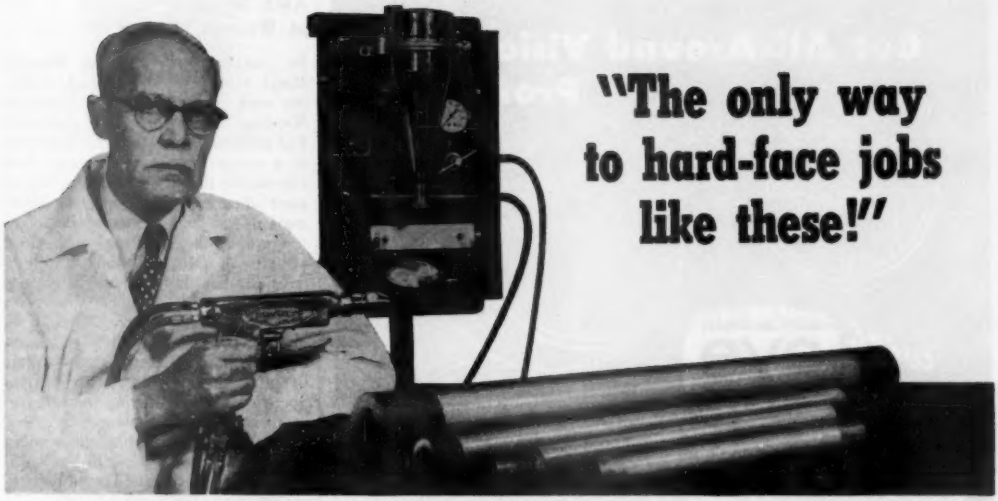
Overhead weld in 3/8-in. plate welded with Hobart No. 10 electrodes.

Vertical fillet weld in 3/8-in. plate welded upward with Hobart No. 10.

Whatever the position . . . the Hobart "10" gives you better, faster welds at lower cost.

HOBART BROTHERS COMPANY
Box U-511, Troy, Ohio
"One of the world's largest builders of arc welders"

Simplify all your welding by using HOBART ELECTRODES



"The only way to hard-face jobs like these!"

COLMONOY SPRAYWELD PROCESS*

*A process of *welding* sprayed metal

1. *Less Material* is used with the Sprayweld process than with hand welding because the thickness of the overlay is easily controlled to within .010".

2. *Less Time* is required to spray and fuse than to laboriously apply the overlay with a rod. Most time is saved in finishing the work, the Sprayweld application being much closer to finish dimensions than hand welding.

3. A Sprayweld surface *Lasts Longer* because it is dense and smooth, with no pinholes or porosity. Colmonoy alloys, used in Spraywelding, are highly abrasion and corrosion resistant, and give up to 25 times longer life, than original equipment.

SPRAYWELDER IN ACTION

Here the spraywelding of an 18.8 stainless steel autoclave shaft is in progress. Colmonoy No. 6, the alloy being sprayed, has great resistance against the wear and corrosion caused by gases under pressure (encountered in the synthesis of ammonia). This shaft will last 12 times longer than would an unfaced one.

ORDER FROM YOUR LOCAL JOBBER

WALL COLMONOY

CORPORATION

HARD FACING ALLOYS

19345 JOHN R STREET DETROIT 3, MICHIGAN

Colmonoy is a complete line of hard facing alloys. They have various properties and come in many forms: rod, wire, powder, paste and castings. Powdered Colmonoy 4, 5, and 6, all nickel base alloys, can be used in the Colmonoy Spraywelder.

The Colmonoy Spraywelder is the powder metallizing gun, shown below. It provides a simple, low-priced method of applying hard facing alloys to withstand corrosion and abrasion.

This process we call Spraywelding. You *spray* the Colmonoy alloy on, then *weld* it by bringing the overlay to a fusing temperature. Thus Colmonoy Spraywelding combines the advantages of two familiar processes: the *smooth application* of metallizing, with the true *molecular bonding* of welding.

Many *worn* parts, commonly discarded, may now be hard faced the Sprayweld way.

Many *new* parts, commonly made of expensive, hardened alloy steel, may now be made of mild steel and Spraywelded with Colmonoy.

The process is essentially three steps:

- Preparing the surface by grit blasting or by rough threading.
- Spraying the surface with the Colmonoy Spraywelder or your own metallizing equipment (using Colmonoy Spray Weld wire).
- The fusion of the overlay to the base metal by using an oxy-acetylene torch, or controlled atmosphere furnace.

WALL COLMONOY CORPORATION

19345 John R Street • Detroit 3 • Michigan

Please send me information about Colmonoy hard facing alloys.

Name _____ **Title** _____

Firm _____

Street _____

City _____ **State** _____

Get All-Around Vision and Protection

with WATCHEMOKET eye SAVERS

TUC-AWAY WELDER'S GOGGLE

Here's the ideal flash goggle for under-helmet use and other glare and impact hazards! Each Tuc-Away lens and side shield is a one-piece plastic unit providing wide-angle vision and *sure* eye protection. 3 different "change-around" lens units are available for various types of eye hazards. Exclusive Retrax "telescoping" temples assure perfect fit and comfort. Order from your welding (or safety) supplier or write direct.

FREE! *Send for magazine article giving impartial advice on best uses of plastic eye protection. Eye-Savers catalog also included.*

WATCHEMOKET OPTICAL CO., INC. DEPT. 5, PROVIDENCE, R. I.

Producers & Originators of Practical Plastic Eye Protection

An Unbeatable Combination!

SILVALOY SILVER BRAZING ALLOYS

The Silvaloy group consists of 7 popular silver brazing alloys high in tensile strength and producing strong, ductile joints on ferrous and non-ferrous metals.

	SILVER CONTENT	MELTING POINT	FLOW POINT
SILVALOY 50	50%	1160 F	1175 F
SILVALOY 45	45%	1125 F	1145 F
SILVALOY 40	40%	1135 F	1205 F
SILVALOY 35	35%	1125 F	1295 F
SILVALOY 20	20%	1430 F	1500 F
SILVALOY 15	15%	1185 F	1280 F
SILVALOY 503	50%	1195 F	1270 F

1200 All-Purpose Flux—for use on all metals. No. 1200 Flux readily dissolves oxides during brazing operations and aids in the flowing of the alloy. Meets all government specifications.

1100 Low Temperature Flux—superior where exceptionally clean surfaces on copper or copper alloys are required at lower temperatures.

COMPLETE STOCKS

Oxy-acetelyne welding rods and flux for cast iron, steel, aluminum, brass, copper, bronze, nickel, monel and inconel.

STEEL SALES
CORPORATION

3348 SOUTH PULASKI ROAD • CHICAGO, ILLINOIS

BRANCH PLANTS: Detroit, St. Louis • **BRANCH OFFICES:** Milwaukee, Minneapolis, Grand Rapids, Indianapolis, Kansas City, Mo.

AWS Members Convene at Western Metal Show

IN CONJUNCTION with the Western Metal Congress at Oakland, Calif., the week of March 19, the American Welding Society presented a diversified program of welding developments to a meager group of listeners. It is regrettable that the attendance was so poor when so much interesting information was being disseminated.

Though the meeting started at 10:00 a.m. Monday, the real highlight of that day was the American Welding Society's official luncheon held at the Lake Merritt Hotel. J. G. Magrath, AWS executive secretary, advised the 150 guests at this affair of the progress the American Welding Society has made during the last two years and its future plans.

At the morning technical session, L. C. Hollister, division bridge engineer, California State Highways, revealed some interesting plans in connection with the proposed $10 million all-welded freeway viaduct. California is also making many advances in welded bridge construction.

LaMotte Grover, welding engineer of Air Reduction Sales Co., followed up Mr. Hollister on the subject of bridges. "No serious difficulties," he said, "have been reported in welded bridges in the United States or other countries where suitable steel materials have been used; nor in welded building in any country. Some thirteen years ago, in Belgium and Germany, such difficulties were experienced in welded bridges and likewise, recently, in a Canadian bridge; but the steel materials involved in these particular cases were very much inferior to the steel used for bridge construction in the United States and inferior to that usually employed in Canada."

Most of the week's technical sessions were devoted to the importance of welding in our defense program and its use in maintenance applications. The Wednesday afternoon session was different in this regard since it featured inert-gas-shielded arc welding. The first paper of the afternoon, by H. E. Rockefeller, of Linde Air Products, reviewed the fundamentals of the process and told of the major developments that have brought it to its present stage of application. Mr. Rockefeller also made predictions as to expected future trends. Finally, he described the comparative fields for applications of the non-consumable and the consumable electrode branches of the process with reference to various metals including aluminum, stainless steel, copper, copper alloys and carbon steel.

THE
ARC-FIT
PROCESS
Tube notched with special ARC-FIT
Angular notch on tubular member.
Square tube notched to fit square pipe.
Angle joint on two pipes.
"T" notch on end of Tubular member.
Pipe Notched with deep slot.
"T" joint on tube or pipe.
Angle iron notched to fit pipe.

TOPS IN SHOP EFFICIENCY

5 seconds to notch Tubing and Pipe Ends

The answer to many problems confronting large and small shop owners. No shop can afford to be without the ARC-FIT—no matter how large or how small. Manual or power operated—fits the ARC-FIT hand press or any standard power press.

ARC-FIT is a patented precision-built shearing tool which prepares the ends of tubing or pipe to produce welded or brazed tubular "T" or angle joints. ARC-FIT will not deform the tube or pipe and no further finishing is required—no sawing, cutting, or removing sections with milling cutters. Our literature gives many fine points on operation, construction, and application—send for it today —also write for quotations.

VOGEL TOOL & DIE CORPORATION

1825 N. 32ND STREET
Dept. W-E
MELROSE PARK, ILL.

H. H. Berryman, Air Reduction Pacific Co., presented the second paper of the inert-gas welding session on "The Role of Aircomatic Welding in Defense Production Economy." In this good paper, the author brought out the importance of the semiautomatic process using consumable electrodes, when viewed in the light of defense production requirements. A number of mass-production applications, he pointed out, indicate that the process is suitable for quantity work on heavy sections, for special materials and on intricate work such as is involved on military equipment. Mr. Berryman reviewed some of the comparable civilian jobs that have paved the way to defense applications.

On Friday morning an educational session was held, with two speakers. T. B. Jefferson, editor of THE WELDING ENGINEER, presented a progress report on welding processes, outlining the important advances that have been made in all processes in recent years. Editor Jefferson emphasized the need for greater educational activities and a better understanding of the welding engineer's problems so as to insure continued progress.

Professor Richard C. Wiley, California State Polytechnic College, discussed the controversial topic, "Should Welding Be on Its Own in Education?" Professor Wiley included an interesting report of the progress that welding education has made in western colleges. Among engineering faculties, however, there seems to be a wide variance of opinion as to the importance of welding.

The week's sessions closed with an open discussion on the education of the welding engineer. Many interesting revelations were made. It was the consensus of all present that there is a big job to be done in educating—not only welding engineers but also the engineering faculty members who are to teach them.

On the social side, the San Francisco section of AWS sponsored a dinner dance at the Claremont Hotel in Oakland. Starting out with a cocktail party, this was a gala affair with over 500 in attendance. The huge turnout helped to make the week a success despite the miserable attendance at the technical sessions.

* * *

Norton Company Opens Silicon Carbide Plant

A NEW ELECTRIC furnace plant for the manufacture of silicon carbide abrasive was opened recently at Cap-de-la Madeleine, Quebec, by Norton Co. The plant is expected to increase Norton's output of silicon carbide by 50%.

A Word of Thanks!

TO USERS AND DISTRIBUTORS OF OUR WELDING RODS

• In achieving the position of leadership as the country's largest manufacturer of cast iron welding rods, we wish to thank those who have placed their faith in FUSE-WELL Welding Rods and Electrodes.

We have always endeavored to supply the needs of our customers with uniform, high-quality rods; and to meet their service requirements through the country's finest distributors.

In times like this, the confidence you have in FUSE-WELL is important, and you may be sure we will continue to supply the rods, electrodes and fluxes you need to the fullest extent of our ability and production facilities.

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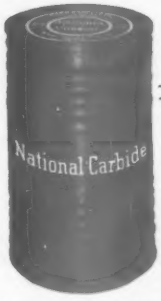

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Alberta Welders Meet For First Convention

THE first convention of the Alberta Association of Certified Weldors was held on March 1, in Edmonton, Alberta. The convention passed a resolution endorsing an application by a group of members to the Trade and Labour Congress of Canada to form a weldor's union.

Speakers at the convention included H. Thomasson, Canadian Westinghouse Co., Ltd.; J. Spankie, chief welding examiner of Alberta and D. Duhamel, Workmen's Compensation Board.

J. W. A. deBoer was re-elected provincial president of the association. S. Edwards was elected first vice-president; C. V. Bryden, Calgary, second vice-president and R. Cummings of Edmonton, secretary-treasurer. S. Dunwald, Edmonton, was appointed recording secretary. A banquet attended by 150 welding men and their wives closed the convention.

• • •

Here's Why Aluminum Is Now Hard to Get

WHEN YOU CONSIDER how much aluminum is used in war materials, you can see why so much of the light metal has disappeared from civilian supply sources. For instance, just one B-36 intercontinental bomber uses 50 tons of aluminum.

Aluminum is likewise used in the 3.5-in. super bazooka, rockets, rocket-launchers, aircraft landing mats, tactical and floating bridges, towers for the big radar screen across our national outposts, "invasion pipe" for fuel lines, PT boats (they're all-aluminum now), submarines, rocket fuel containers, food packages, field kitchens, medical field chests, etc.

• • •

Contact Welding Used on British Locomotives

TO WELD flexible stay sleeves on the outside wrapper plates of locomotives, the North British Locomotive Co. Ltd., Glasgow, Scotland, uses contact welding electrodes. The single-pass weld must be tight and withstand a hydraulic test pressure of 225 psi and 175 psi steam, according to *The Welder*, an English trade magazine.

Welding is carried out at 175 amp, the electrode being dragged around the weld joint at an angle of 45-deg to the line of travel.

An advantage claimed for this process is the ability of the weldor to change his position with ease.

—McGraw-Hill World News

Omaha Welding Tells Its Customers about Priorities

TO CLEAR up some of the fog about priorities on maintenance, repair and operating supplies (including welding rod, electrode holders, etc.), Omaha Welding Company, Omaha, Nebraska, has sent its customers a question-and-answer folder covering common problems. Omaha Welding assumes no responsibility for its interpretations.

Basis for the Omaha Welding pamphlet is the new National Production Authority Regulation 4, that assigns a priority to all businesses, schools, churches, dealers, repair shops, etc. for maintenance, repair and operating supplies. To extend this priority, says Omaha Welding, the words "DO 97 Certified N.P.A. regulation 4" should be placed on the order for supplies. Here are some of the questions and answers quoted from the folder:

What can be bought with this priority? You can buy minor capital additions, such as welders, machinery or equipment costing not more than $750. In addition, you can buy maintenance, repair or operating supplies for others, where you are doing the repairing. (This is not charged to your quota, but to the owner's quota.) Operating supplies means materials essential for conducting your business such as electrodes, tools, etc.

How much can one buy on this priority? As much as $1,000 worth can be bought every quarter (three months). If you need more than this, it's best to write the National Production Authority in Washington, D. C., and get a copy of the original order so you can comply with it.

What records are necessary when using this priority? You should keep invoices on all maintenance, repair or operating supplies and minor capital additions.

Can I originate this priority for material I need to manufacture a product? No, but you can extend a priority you have received from the user of your product to secure materials.

What about merchandise purchased for resale? You should obtain this certification from your customers wherever possible and then extend this priority to the welding distributor when replacing the merchandise in your stock. This isn't charged against your quota.

Can I extend a priority I receive? Yes, you can extend it without charging it to your quota.

Are there any limits to inventories one can purchase this way? Yes, you cannot have more than a reasonable working inventory.

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you can pay more...but you won't get better eye protection!

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BEST THING NEXT TO YOUR EYES

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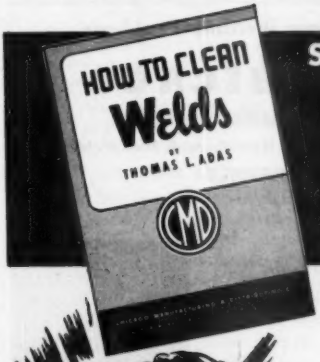

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"HOW TO CLEAN WELDS" is a valuable booklet — that will help you teach apprentices *quickly and correctly*. Also your experienced weldors will appreciate the many time-saving methods illustrated. It will help you prevent costly mistakes that waste metal and cause unnecessary delay. Send today for the copies you need and watch your profits grow through improved workmanship!

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NEW . . . USED . . . REBUILT

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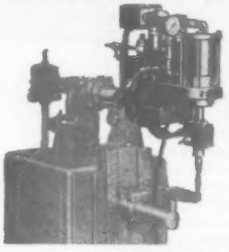

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—Spot Welder air conversion unit

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Tests prove 10,000 welds hourly on continuous daily schedules. Eliminates manual foot operation.

Water-cooled, fits any spot welder with minimum horn clearance of 7". Eliminates hand clamping, upsetting and releasing.

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About People

A. F. VINSON, manager of General Electric's Welding Divisions at Fitchburg, Mass., has temporarily relinquished his duties in order to attend the Advanced Management Program's Business Training Course at the Harvard Graduate School of Business Administration. R. C. FREEMAN will be acting manager during Mr. Vinson's absence.

* * *

WILLIAM P. KRAMER and RICHARD V. ANDERSON are co-manager of the new Detroit branch office of National Electric Welding Machines Co., Bay City, Mich. Mr. Kramer has had extensive experience in automotive and airframe tooling and welding work. Mr. Anderson has had special steel mill experience as well as 11 years of sales and application work with resistance welders.

* * *

HUGH D. CAMERON has been appointed president of Air Reduction Canada Ltd. He will continue to serve as president of Ohio Chemical Canada Ltd. HUGH CHAMBERS, president of Air Reduction Canada Ltd. for many years has been elected chairman of the board.

* * *

GEORGE M. HOLLMAN has been named manager of the defense production division for the Alloy Rods Co. at York, Pa. He was formerly midwest regional sales manager at Chicago and has been with the welding industry some 14 years.

* * *

ANDREW KALITINSKY, former chief engineer of the Nuclear Energy for Propulsion of Aircraft Project has been appointed by The M. W. Kellogg Company as manager of the special projects department.

* * *

GORDON F. COLSON has been appointed field engineer in the Chicago area for the abrasive division of Norton Company.

* * *

W. G. ARNOLD has been appointed manager of manufacturing of General Electric's Welding Department. Mr. Arnold came to work for G-E in 1913 as an apprentice. Before this promotion, he was works manager of the Fitchburg Works.

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ELECTRIC AND GAS WELDING

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WRITE FOR BULLETIN 77

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BENDING ROLLS ★ WELDING FIXTURES
FORMING MACHINES ★ TURNING ROLLS
SPECIAL MACHINES & FIXTURES

Died . . .

CHARLES LUKENS HUSTON, 94, an "elder statesman" of the American steel industry, died March 14 at his home in Coatesville, Pa. He marked his 75th year with Lukens Steel Company last Dec. 15 and was at his desk almost daily until a week before his death. He planned and designed the Lukens 206-in. plate mill and was responsible for the first head spinning machine at Lukens in 1885.

* * *

J. KENNETH SHAFFER, age 47, regional superintendent of The Linde Air Products Co. at Chicago, died on March 30. He is survived by his wife, a sister and two brothers.

* * *

HARRY H. LUMLEY, retired Chicago district executive of U. S. Steel's American Steel and Wire Co., died in Florida on March 31. Mr. Lumley, who started his career with U. S. Steel as a messenger in 1901, had been in ill health for many months and had been making his home in Coral Gables, Fla., since May, 1950.

* * *

30 YEARS AGO

(From THE WELDING ENGINEER of May, 1921)

PHOTOGRAPHERS in factories welcome the chance to include arc weldors at work in a scene. The light from the electric arc brightens up the whole picture and makes clear details that otherwise hardly show up.

—30 YEARS AGO—

WELDING Monel metal is not difficult for the operator who knows how to weld aluminum or cast iron, reports a correspondent. He recommends using a soft oxyacetylene flame with an excess of acetylene. Both sheets should be beveled and welded as fast as possible so that the metal does not get hot and form blowholes.

—30 YEARS AGO—

STANDARD Tests of Welds are published in this issue of THE WELDING ENGINEER for the first time. Dr. Comfort A. Adams, in a special foreword to the welding industry, urges widespread use of the tests for a year, at the end of which time they will be modified if desirable.

—30 YEARS AGO—

A SIDEWALK made of metal and glass in front of the Chicago Hardware Foundry Co., Chicago, was recently handily cut up for repairs with an oxyacetylene torch.

A practical manual of *latest techniques and industrial applications of oxygen cutting*

HERE is a detailed picture of the current state of the oxygen cutting art . . . of the equipment and techniques used in this process . . . and the many varied applications of the process, both new and old. From this book the reader can get the necessary background of theory and practice that will enable him to increase his skill and to find new and valuable uses for the process. Covers everything from the basic fundamentals to the economics and future of oxygen cutting.

Just Published

OXYGEN CUTTING

By *George V. Slottman*, Director of Research and Engineering, Air Reduction Co.

and *Edward H. Roper*, Assistant Technical Sales Manager, Air Reduction Sales Co.

395 pages, 6x9, 191 illustrations, $6.50

BASED on a popular series of articles which appeared in *American Machinist*, the book provides a basic outline of the oxygen cutting process and its practical applications. It points up recent advances in the field such as: flame machining, flame scarfing, underwater cutting, rock drilling, electronic tracers for cutting machines, and developments in heavy cutting. Special chapters are devoted to metal temperature — plant facilities—hand and machine cutting, types of cutting machines—multiple and stack cutting—and many other topics. The practical operator as well as the research worker will find this manual of simple explanations and clear illustrations a storehouse of usable information to help gain the fullest advantage of oxygen cutting techniques and applications.

Covers practical topics such as these:

- the preheating flame
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- effects of oxygen purity
- the oxygen lance
- tracers and templates
- electronic tracing devices
- heavy cutting
- effect of alloying elements on cutting action
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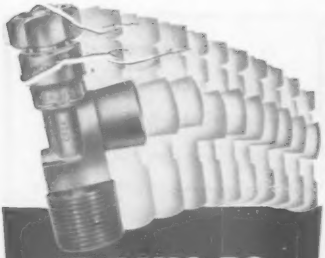

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1. Threads are always protected from weld spatter, and never exposed to damage in open or closed position.

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3. Heat treated chrome molybdenum alloy handle offers great resistance to bending.

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1869 Clybourn Ave. Chicago 14, Illinois

From the Patent Office

Welding Helmet

2,544,457. WALTER R. HARRINGTON, Rising Sun, Md. Filed Dec. 12, 1949. Granted March 6, 1951.

A newly patented welding helmet includes a frame adapted to be positioned on a weldor's head, a face mask pivoted to the frame and swingable from a face shielding position to an inoperative position above the head, and an eye shield pivoted to the frame and swingable from an eye shielding position to an inoperative position above the eyes. A guide mounted on the frame has a flexible connecting element passing around it. One end of the element is attached to the mask and the other end is attached to the eye shield. By this arrangement, the eye shield is lowered when the mask is raised and the shield is raised when the mask is lowered.

* * *

Weld Composition

2,544,336. GEORGE E. LINNERT, Baltimore, Md. Assigned to Armco Steel Corp. Filed May 2, 1949. Granted March 6, 1951.

Patent refers to a weld deposit in a welded article. The deposit, specifically, is an austenitic chromium-nickel stainless steel substantially free of sigma phase and carbide precipitation. It contains, approximately, carbon up to 0.03%, 16 to 21% chromium, 10 to 20.5% nickel, 1.75% to 4% molybdenum, sulphur and phosphorus each not exceeding 0.02%. The remainder is substantially all iron, the chromium, molybdenum and nickel further being in accord with this formula:

$$\frac{\text{Per cent Cr} + 2 \times \text{Per cent Mo}}{\text{Per cent Ni}} = \text{a numerical value not exceeding about } 1.50$$

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- Tinning Compound
- Burnt Cast Iron Welding Flux
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- Special Brazing Flux for Aluminum Bronze, Everdur, and All Silicon Bronzes
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PRODUCTS
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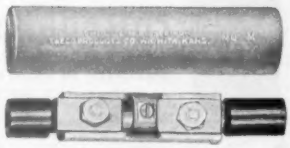

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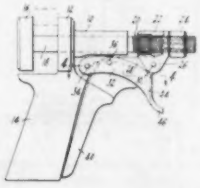
WICHITA, KANSAS

Trigger Release Toggle Clamp

2,544,329. JAMES A. KIRK, East Walpole, Mass. Assigned to James A. Kirk and George E. Young, copartners, doing business as Kirk & Young Machine Co., East Walpole, Mass. Filed Feb. 21, 1947. Granted March 6, 1951.

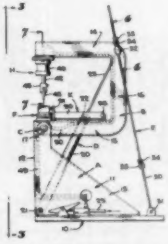


A recently patented toggle clamp includes a member having a bore through it. A rod extends through the bore. Clamp jaws are on the member and rod, respectively. A sleeve is screw-threaded on a projecting portion of the rod remote from the jaws. A toggle joint connects the member and sleeve. The joint consists of toggle links pivoted respectively to the member and the sleeve and pivoted to each other. An extension on one of the links beyond the common pivot serves as an operating lever.

* * *

Work Holder for Welding

2,546,458. ERNIE L. LAUNDER, Montebello, Calif. Assigned to H. L. Tooth Co., Los Angeles, Calif. Filed Nov. 14, 1947. Granted March 27, 1951.



This patent refers to a work holding machine that includes a stationary base, a C-shaped frame with spaced upper and lower arms and means pivotally connecting the outer end of the lower arm of the frame to the base on a horizontal axis extending transverse of the machine with the frame opening toward the front of the machine.

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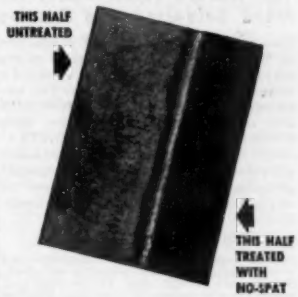

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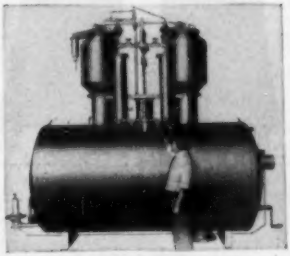

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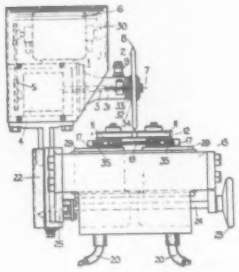
2,543,668. James Ronald Penrose, Watford, and James Arthur Donelan, West Harrow, England. Assigned to The General Electric Co., Ltd., London. Filed May 21, 1949. Granted Feb. 27, 1951.

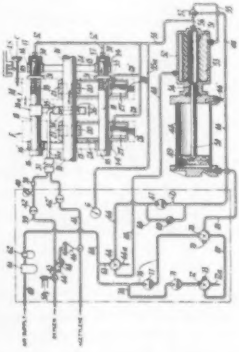


Patent refers to a process for arc welding seams by relative movement of the seam and a welding head carrying an electrode. The welding electrode has a curved surface for the root of the welding arc. This surface moves, during welding, in a direction opposite to the movement of the seam. It moves at such a speed that the arc is held substantially in a given position relative to the welding head. The arc root on the welding electrode moves along the curved surface.

• • •

Automatic Pressure Welding

2,544,749. John P. Cowie, Youngstown, O., and Charles J. Burch, Plainfield, N. J. Assigned to The Linde Air Products Co. Filed Aug. 27, 1946. Granted March 13, 1951.



Patent refers to pressure welding apparatus that comprises mechanisms for clamping metal members to be united with a surface of each in abutting relation during a welding operation.

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1234 Broadway, New York 1, N. Y.

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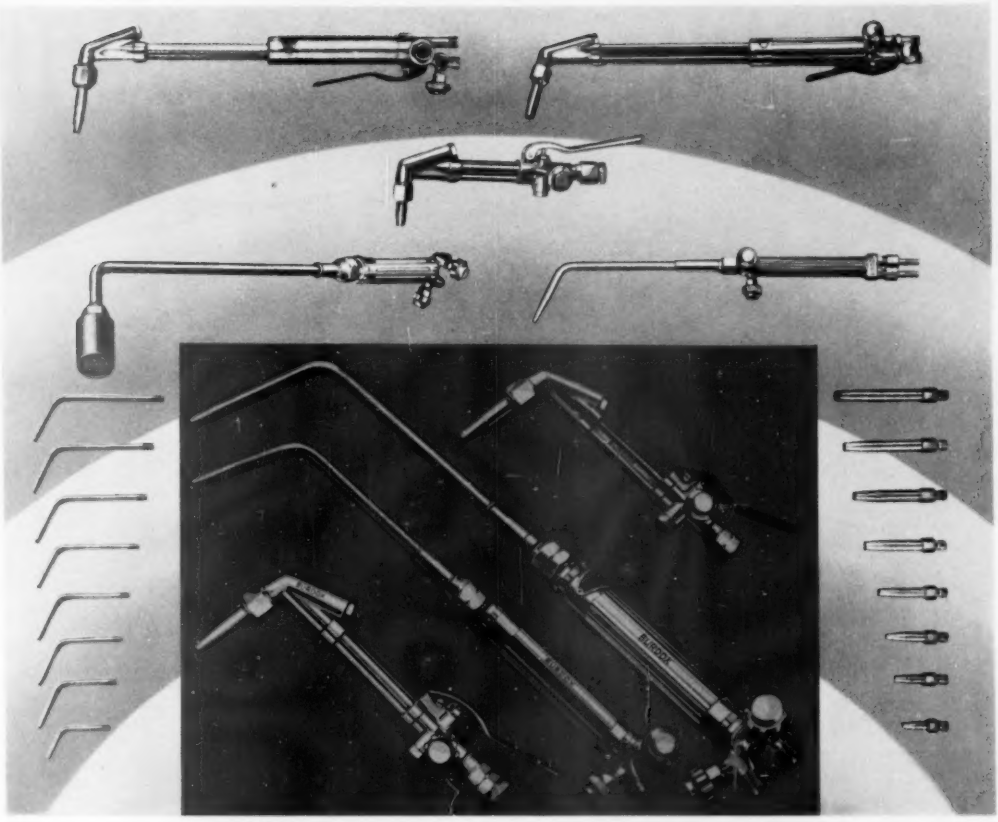

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